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Perinatal HIV Prevention: A Statewide Survey of Missouri Health Professionals About Critical Issues on Perinatal HIV Transmission

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Introduction

Results of the Pediatric AIDS Clinical Trials Group (PACTG) Protocol 076 study demonstrated that administration of zidovudine (ZDV, AZT) to HIV-infected pregnant women and their newborns can significantly reduce the risk of perinatal HIV transmission.[1] Subsequent epidemiologic data have confirmed the efficacy of ZDV for reduction of perinatal transmission and have extended this efficacy to children of women with advanced disease, low CD4+ T-lymphocyte counts, and prior ZDV therapy.[2] These are significant findings which make it increasingly important for all prenatal providers to identify pregnant women who are infected with HIV and offer them the opportunity for appropriate treatment to reduce the chances they will transmit the virus to their offspring. In 1995, the Missouri Department of Health, together with health professionals from outside the department, developed a policy to reduce the risk of perinatal HIV transmission in Missouri. In early 1998 a questionnaire was developed and sent to selected medical providers in the state to assess their current beliefs and practices relative to prevention of perinatally transmitted HIV infection. This report will analyze the responses to this questionnaire from three specific groups of professionals providing care to pregnant women: obstetrician/gynecologists (OB/GYNs), general/family practice physicians (GP/FPs) and advanced practice nurses (APNs)†.

Methods

A list of 1997 Missouri-licensed OB/GYNs (n=606), GP/FPs *who reported delivering infants* (n=130) and APNs *who reported obstetrics/gynecology as an area of interest* (n=227) was obtained from the State Center for Health Statistics. The Missouri Perinatal Association collaborated with the Missouri Department of Health to conduct the study using the "total design method."[3] A questionnaire was sent in January 1998 to each of these 963 professionals. Unique identifiers linked to specific provider data allowed for aggressive follow-up of unreturned surveys in order to reach the target response rate of 75 percent.

Results

Questionnaires were sent to 963 professionals. Early in the study, 63 individuals were dropped from further follow-up for the reasons listed in Table 1 on page 2, reducing the study pool to 900. Of this group, 672 returned their questionnaires for an overall return rate of 74.6 percent. Questionnaires were returned by 389 (70.0%) of 556 OB/GYNs, 92 (72.4%) of 127 GP/FPs, and 191 (88.0%) of 217 APNs. Each individual was asked on the questionnaire whether he or she had personally provided care or services to pregnant women since the beginning of 1997; only the 545 respondents who indicated that they had provided such care or services in Missouri (338 OB/

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†Advanced practice nurses are in middle management, have a teaching or consultant role and/or are nurse practitioners or certified nurse midwives.

Table 1. Prenatal Provider Survey Potential Subjects Dropped From Study by Reason and Type of Provider, Missouri, 1998.

Reason Dropped From Study	OB/GYN Physicians		GP/FP Physicians		Advanced Practice Nurses	
	Number	Percent	Number	Percent	Number	Percent
Moved Out of State	19	38.0%	2	66.6%	1	10.0%
No Missouri License	11	22.0%	1	33.3%	0	0.0%
Letter Undeliverable	5	10.0%	0	0.0%	1	10.0%
Unclaimed Certified Mail	4	8.0%	0	0.0%	2	20.0%
Retired	5	10.0%	0	0.0%	0	0.0%
Practice Out of Missouri	0	0.0%	0	0.0%	4	40.0%
Refused to Participate	2	4.0%	0	0.0%	1	10.0%
Stopped Prenatal Care	2	4.0%	0	0.0%	0	0.0%
On Medical Leave	1	2.0%	0	0.0%	0	0.0%
Unemployed	0	0.0%	0	0.0%	1	10.0%
Deceased	1	2.0%	0	0.0%	0	0.0%
TOTAL	**50**	**100.0%**	**3**	**100.0%**	**10**	**100.0%**

Table 2. Prenatal Provider Survey Participants by Geographic Area of Practice and Type of Provider, Missouri, 1998.

Geographic Area of Practice	OB/GYN Physicians		GP/FP Physicians		Advanced Practice Nurses	
	Number	Percent	Number	Percent	Number	Percent
St. Louis Area*	143	42.3%	1	1.2%	22	17.9%
Kansas City Area**	66	19.5%	9	10.7%	23	18.7%
Outstate Missouri	129	38.2%	74	88.1%	78	63.4%
TOTAL	**338**	**100.0%**	**84**	**100.0%**	**123**	**100.0%**

*St. Louis City, St. Louis County and St. Charles County
**Cass, Clay, Jackson, Lafayette, Platte and Ray counties

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GYNs, 84 GP/FPs, and 123 APNs) are included in the analysis which follows. Table 2 indicates the geographic areas where these 545 respondents practice.

Table 3 summarizes the experience of these 545 providers with regard to caring for HIV-infected pregnant women. Overall, 86 (15.8%) respondents indicated that they had knowingly cared for one or more such infected women since January 1997.

Table 3. Proportion of Survey Participants Who Have Knowingly Provided Care* to HIV-Infected Pregnant Women by Type of Provider, Missouri, 1998.

Type of Provider	Proportion Who Have Knowingly Provided Care* to HIV-Infected Pregnant Women	
Obstetrician/Gynecologist	60/338	(17.8%)
General/Family Practitioner	5/84	(6.0%)
Advanced Practice Nurse	21/123	(17.1%)

*Since January 1997

Table 4 summarizes the responses of the three provider groups to statements related to prevention of perinatal HIV transmission. High percentages of respondents (>80%) in each of the provider groups agreed or strongly agreed that childbearing-age women should be evaluated for their HIV risk, and that they should receive HIV education/counseling as a routine part of their care. However, among physician respondents, a much smaller proportion (57.4% of the OB/GYNs and 51.2% of the GP/FPs) felt that such education/counseling should be a requirement for providers. Over 90 percent of respondents in each of the provider groups agreed or strongly agreed that all pregnant women should be offered HIV testing as part of their prenatal care, but a much lower percentage (49.7% of OB/GYNs, 50.0% of GP/FPs and 46.3% of APNs) believed that such testing should be mandatory. High percentages (>90%) of the physician respondents and the APNs agreed or strongly agreed that ZDV can significantly reduce the risk of perinatal HIV transmission. However, lower percentages of providers (67.5% of OB/GYNs, 64.3% of GP/FPs and 47.2% of APNs) felt antiretroviral treatment of HIV-infected pregnant women should be mandatory.

Table 4. Percentage of Survey Participants Who Agree or Strongly Agree with Selected Statements on HIV Prevention by Type of Provider, Missouri, 1998.

Statement	OB/GYN Physicians (n = 338)	GP/FP Physicians (n = 84)	Advanced Practice Nurses (n = 123)
All women of childbearing age should be evaluated for their risk of HIV infection.	88.5%	83.8%	82.9%
All pregnant women should receive HIV education and counseling as a routine part of their prenatal care.	89.3%	89.4%	95.1%
Providers of prenatal care should be required to provide HIV education/counseling to all of their pregnant patients.	57.4%	51.2%	76.4%
All pregnant women should be offered HIV testing by their prenatal provider.	92.9%	98.8%	98.4%
HIV testing of all pregnant women should be mandatory.	49.7%	50.0%	46.3%
Zidovudine (ZDV, AZT) can significantly reduce the risk of maternal-infant transmission of HIV.	95.6%	90.5%	90.2%
Zidovudine (ZDV, AZT) treatment of HIV-positive pregnant women should be mandatory.	67.5%	64.3%	47.2%

Table 5. Percentage of Survey Participants Who Routinely Evaluate Their Childbearing-Age Female Patients for Selected HIV-Associated Risk Behaviors by Type of Provider, Missouri, 1998.

Risk Behavior*	OB/GYN Physicians (n = 338)	GP/FP Physicians (n = 84)	Advanced Practice Nurses (n = 123)
Sexually Transmitted Disease History	96.2%	92.9%	98.4%
Multiple Sexual Partners	74.0%	72.6%	85.4%
Exchange Money/Drugs for Sex	25.1%	19.0%	38.2%
Sexual Contact with HIV-Positive Person	48.2%	54.8%	57.7%
Sexual Contact with Bisexual Male	23.7%	23.8%	45.5%
Sexual Contact with Injecting Drug User	39.1%	50.0%	51.6%
Sexual Assault or Rape	49.7%	46.4%	71.5%
Drug Use History	91.7%	86.9%	92.7%
Residence in Areas With High HIV Rates	15.4%	15.5%	12.5%
None of the Above	1.5%	3.6%	0.0%

*Respondents were instructed to indicate all risk behaviors that are routinely evaluated.

Providers were asked if they had heard of the PACTG Protocol 076 study and its findings.[1] High proportions responded affirmatively (89.1% of OB/GYNs, 79.8% of GP/FPs and 77.2% of APNs). Among those providers who reported having cared for HIV-infected pregnant women, these percentages were even higher (100% of OB/GYNs, 100% of GP/FPs and 95.0% of APNs).

The providers were then asked if they were aware of the published clinical guidelines from the United States Public Health Service (USPHS) on the use of antiretroviral medications to reduce the risk of perinatal HIV transmission.[4] A relatively high percentage of OB/GYNs (74.6%), but lesser percentages of other providers (63.1% of GP/FPs and 61% of APNs) indicated awareness. Among those who reported having cared for HIV-infected pregnant women, the percentage with knowledge of the guidelines was higher for the OB/GYN and APN provider groups (91.5% of OB/GYNs, 60% of GP/FPs and 80.9% of APNs). All respondents who indicated they had knowledge of the guidelines were next asked to respond to the

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statement that these guidelines represent reasonable recommendations which should generally be followed by prenatal providers. Agreement or strong agreement with this statement was lower for all providers (69.8% of OB/GYNs, 73.6% of GP/FPs and 50.7% of APNs).

Table 5 on page 3 describes the practices of OB/GYNs, GP/FPs and APNs regarding the medical/social history which is routinely obtained on their patients who are *women of childbearing age*. A very high percentage of these providers reported that a history of both sexually transmitted diseases (STDs) and drug use is solicited from these patients on a routine basis. Other risk behaviors, however, are less consistently evaluated.

Providers were questioned about provision of HIV/AIDS education to their childbearing-age female patients. In response, 23.7 percent of OB/GYNs, 19.0 percent of GP/FPs and 29.3 percent of APNs indicated that such education is provided to all patients who are women of childbearing age. In contrast, 10.4 percent of OB/GYNs and 21.4 percent of GP/FPs indicated that HIV/AIDS education is never provided to these patients. No APNs indicated that HIV/AIDS education is *never* provided to these patients.

Providers were additionally asked about provision of HIV counseling before a patient is tested for HIV infection. In response 90.8 percent of OB/GYNs, 83.3 percent of GP/FPs and 90.2 percent of APNs indicated that such pre-test counseling is routinely performed before HIV testing is undertaken.

The providers were asked to indicate which factors impaired or precluded the implementation of a comprehensive HIV education and testing program in their practice settings. Their responses are shown in Table 6. For each of the provider groups, the most frequently indicated factor impairing their ability to provide such a program was limited staff time (65.1% of OB/GYNs, 70.2% of GP/FPs and 69.1% of APNs). For OB/GYNs and GP/FPs, the second most frequently indicated factor was the perceived low risk of their patient population (this response was indicated by 37.3 percent of OB/GYNs and 50% of GP/FPs). Among APNs, the second most frequently mentioned factor

Table 6. Percentage of Survey Participants Who Indicated That Selected Factors Impaired or Precluded Implementation of a Comprehensive HIV Education/Counseling Program in Their Practice Setting by Type of Provider, Missouri, 1998.

Factor*	OB/GYN Physicians (n = 338)	GP/FP Physicians (n = 84)	Advanced Practice Nurses (n = 123)
Limited Staff Time	65.1%	70.2%	69.1%
Limited Physical Space	0.0%	0.0%	0.0%
No Money for Extra Staff	25.1%	32.1%	24.4%
Patient Population Low Risk/No Need	37.3%	50.0%	30.1%
Low Priority	7.4%	8.3%	0.8%
Lack of Training for Staff	24.6%	32.1%	31.7%
Something Else	6.2%	4.8%	4.1%

*Respondents were instructed to indicate all factors that applied to their practice/work setting.

Table 7. Categories of Pregnant Women Receiving Prenatal Care Who Are Routinely Offered HIV Testing by Type of Provider, Missouri, 1998.

Category of Pregnant Women*	OB/GYN Physicians (n = 338)	GP/FP Physicians (n = 84)	Advanced Practice Nurses (n = 123)
Those believed to be at increased HIV risk based on medical/social history	21.0%	17.9%	17.1%
Those believed to be at increased HIV risk based on physical exam/lab findings	12.4%	13.1%	16.3%
All pregnant women who present for care	84.6%	86.9%	87.0%
Other criteria	1.8%	1.2%	1.6%
HIV testing not routinely offered to any prenatal patients	0.9%	0.0%	0.8%

*Respondents were instructed to indicate all categories of pregnant patients who were routinely offered HIV testing.

interfering with implementation of a comprehensive HIV prevention program was lack of training for staff (this response was indicated by 31.7 percent of APNs).

Questions were asked about the specific practices of these providers with regard to their *pregnant patients*. Table 7 indicates those categories of pregnant women who are routinely offered HIV testing. Over 80 percent of all provider groups reported that testing is offered to all pregnant women presenting for care, regardless of perceived HIV risk (84.6% of OB/GYNs, 86.9 percent of GP/FPs and 87.0 percent of APNs).

Providers were asked what percentage of their pregnant patients *who are offered HIV testing* agree to be tested. Relatively high percentages of respondents (60.7% of OB/GYNs, 72.6% of GP/FPs and 65% of APNs) reported that 75% or more of pregnant patients who are offered testing for HIV consent to be tested. This included 19.8 percent of all OB/GYNs, 38.1 percent of all GP/FPs, and 13.8 percent of all APNs who indicated that 100 percent of their pregnant patients who are offered HIV testing agree to such testing.

Providers were asked whether a pregnant patient who is found to be infected with HIV would continue to receive prenatal care in their practice setting. Their responses are shown in Table 8. Those providers who indicated that an HIV-infected pregnant woman would, at least in some circumstances, continue to receive prenatal care in their practice setting (63.9% of OB/GYNs, 48.8% of GP/FPs and 45.6% of APNs) were then asked about the use of antiretroviral medication in pregnant women. This question, along with the percentage of participants who chose each of the possible answers, is shown in Table 9 on page 6.

Discussion

USPHS[5], along with professional groups such as the American College of Obstetricians and Gynecologists (ACOG)[6], the American Academy of Pediatrics (AAP)[6] and the American Medical Association (AMA)[7], recommended that all pregnant women receive HIV education and counseling, and then be voluntarily tested for HIV. Recent guidelines have been issued by USPHS on the use of antiretroviral medications to reduce the risk of perinatal HIV transmission[2] A 1996 policy statement from the Missouri Department of Health is in agreement with these recommendations[8], and the Missouri Perinatal Association has also expressed its support.[9] It is encouraging that a high proportion of respondents to the present survey agreed on the need for HIV risk assessment, education and counseling, as well as on the importance of HIV testing for pregnant women. A high proportion of respondents also agreed that ZDV can significantly reduce the risk of perinatal transmission of HIV.

There was much less agreement among survey respondents on whether there should be mandatory HIV testing of pregnant women, and mandatory antiretroviral treatment of those pregnant women who are HIV-infected. This is reflective of the ongoing societal debate on these issues. With regard to HIV testing, the Centers for Disease Control and Prevention (CDC) has stated that high levels of test acceptance can be achieved among women without mandating testing.[5] Evidence for this is less obvious in the present survey where, for example, only 38.1 percent of the GP/FPs reported that when HIV testing is offered to their pregnant patients, 100 percent of these women agree to be tested. The acceptance rates for HIV testing may reflect the manner in which HIV testing is presented.

The fact that approximately 25 percent of survey questionnaires were not returned requires that caution be exercised in attempting to generalize the results to all prenatal providers in Missouri. However, certain findings from the survey suggest opportunities for improvement in the knowledge and

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Table 8. Responses of Survey Participants to the Question of Whether an HIV-Infected Pregnant Woman Would Continue to Receive Prenatal Care in Their Practice Setting by Type of Provider, Missouri, 1998.

Response	OB/GYN Physicians (n = 338)	GP/FP Physicians (n = 84)	Advanced Practice Nurses (n = 123)
Continue to receive prenatal care (possibly in consultation with other professionals)	36.1%	23.8%	22.8%
Be referred to a provider in another practice setting to receive her prenatal care	35.5%	50.0%	53.6%
The decision on whether to continue to provide prenatal care (vs. referral to a provider in another practice setting) would be based on the women's stage of illness and/or other factors	27.8%	25.0%	22.8%
No response	0.6%	1.2%	0.8%

Table 9. Responses of Survey Participants* to a Clinical Question Regarding the Use of Antiretroviral Medication in an HIV-Infected Pregnant Woman by Type of Provider, Missouri, 1998.

If a pregnant woman receiving prenatal care is found to be HIV+, which of the following would most likely result?

Response	OB/GYN Physicians (n = 216)	GP/FP Physicians (n = 41)	Advanced Practice Nurses (n = 56)
Continue the combination antiretroviral therapy	46.3%	44.0%	16.1%
Switch from combination antiretroviral therapy to zidovudine (ZDV, AZT) monotherapy for the remainder of the pregnancy.	30.1%	31.7%	30.4%
Discontinue the combination antiretroviral therapy. If the woman's CD4+ count is <500 cells/mL, begin ZDV monotherapy and continue this regimen for the remainder of the pregnancy.	5.6%	7.3%	3.6%
Discontinue all antiretroviral drugs for the remainder of the pregnancy	0.0%	0.0%	0.0%
No response	18.1%	17.1%	50.0%

* Only respondents who indicated that they would, at least in some circumstances, continue to provide prenatal care in their practice setting to pregnant women known to be infected with HIV were asked to respond to this question.

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practices of providers with regard to HIV prevention:

- Some prenatal providers apparently remain unaware of the PACTG Protocol 076 study[1] and subsequent USPHS recommendations on antiretroviral use.[4]
- While most respondents appear to routinely evaluate their patients for a history of STDs and drug use, a small percentage do not. In addition, a sizable proportion of providers do not routinely evaluate their patients for HIV risk behaviors such as having multiple sexual partners, exchange of sex for money or drugs, and sexual contact with an injecting drug user.
- HIV/AIDS education is not uniformly provided to all female patients of childbearing age. Also, it appears that in some instances HIV counseling is not conducted before HIV testing is performed.[§]
- Although a relatively high proportion of respondents (approximately 75% of all three provider groups) routinely offer HIV testing to all their pregnant patients, there remain many providers who do not routinely offer such testing, despite the fact that it has been recommended by USPHS[5], ACOG[6], AAP[6] and AMA.[7]
- The clinical question shown in Table 9 was answered by respondents who stated they would provide prenatal care, at least in some circumstances, to HIV-infected pregnant women. For this question, answer 1 would be most consistent with current USPHS guidelines[4], which state that "HIV-1 infected women receiving antiretroviral therapy in whom pregnancy is identified after the first trimester should continue therapy." (The guidelines also indicate that "If the current therapeutic regimen does not contain ZDV, the addition of ZDV or substitution of ZDV for another nucleoside analogue antiretroviral is recommended after 14 weeks' gestation.") The relatively small proportion of respondents who chose this answer may reflect, in part, the fact that these guidelines had only very recently been published (the previous USPHS guidelines[10] had only discussed zidovudine monotherapy). The large percentage of respondents (especially among APNs) who did not provide a response to this question would appear to reflect unfamiliarity among many respondents with any of the guidelines on the use of antiretroviral drugs during pregnancy.

The challenge for public health officials, and for other persons and organizations concerned with the health of mothers and infants, is to find practical ways to assist prenatal providers (and medical providers generally) to maximize their HIV prevention efforts. The preceding section suggests specific problem areas towards which such assistance should be directed. In addition, the survey respondents identified certain general issues which, in many practice settings, will need to be addressed before an

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[§] Missouri law (191.653, RSMo) states all physicians, hospitals or other persons authorized by the Department of Health who perform or conduct HIV sampling shall provide consultation with the subject prior to taking the sample and during the reporting of the test results and shall report to the Department of Health the identity of any individual confirmed to be infected with HIV. The accompanying Department of Health rule (19 CSR 20-26.040) states that, where testing is done by a physician or a physician's delegated representative, the scope of the consultation shall be governed by the physician's professional judgment based on the clinical situation, including the purpose of and need for HIV testing, and shall be at least as comprehensive as the type of consultation provided for other diagnostic tests or procedures.

1998 Guidelines for Treatment of Sexually Transmitted Diseases

(Continued from the January-February, March-April and July-August 1998 issues of the *Missouri Epidemiologist*)

Physicians and other health-care providers have a critical role in preventing and treating sexually transmitted diseases (STDs). The following recommendations for the treatment of STDs, which were developed by the Centers for Disease Control and Prevention (CDC) in consultation with a group of outside experts, are intended to assist with that effort.

The recommendations, which update those released by CDC in 1993, were reprinted from CDC's *Morbidity and Mortality Weekly Report (MMWR) Recommendations and Reports*, Vol. 47, No. RR-1, January 23, 1998. This issue of the *Missouri Epidemiologist* contains those sections of the guidelines which relate to diseases characterized by vaginal discharge; pelvic inflammatory disease (PID); epididymitis; cervical cancer screening; proctitis, proctocolitis and enteritis; and ectoparasitic infections. Those sections relating to diseases characterized by urethritis and cervicitis were reprinted in the January-February 1998 issue, to diseases characterized by genital ulcers and congenital syphilis in the March-April 1998 issue and to human immunodeficiency virus (HIV) infection and human papillomavirus (HPV) infection in the July-August 1998 issue.

A full copy of the guidelines and reference list in pdf format can be found on CDC's Division of STD Prevention Home Page at **http://www.cdc.gov/nchstp/dstd/dstdp.htm.**

If you have questions regarding these guidelines, please contact DOH's Section of STD/HIV/AIDS Prevention and Care Services at (573) 751-6439.

Additional information for medical providers on STDs and STD training courses is available on the Internet at the following sites:

CDC's Division of STD Prevention:
http://www.cdc.gov/nchstp/dstd/dstdp.html

CDC's Division of HIV/AIDS Prevention:
http://www.cdc.gov/nchstp/hiv_aids/dhap.htm

CDC's Division of AIDS, STD, and TB Laboratory Research:
http://www.cdc.gov/ncidod/dastlr/dastlr.html

National Network of STD/HIV Prevention Training Centers:
http://129.137.232.101/STDPTC.html

St. Louis STD/HIV Prevention Training Center:
http://www.umsl.edu/services/itc/std_ptc.html
Ph: (314) 747-0294 or 747-1522

Medline - National Library of Medicine:
http://igm.nlm.nih.gov/

Diseases Characterized by Vaginal Discharge

Pelvic Inflammatory Disease (PID)

Epididymitis

Cervical Cancer Screening for Women Who Attend STD Clinics or Have a History of STDs

Proctitis, Proctocolitis and Enteritis

Ectoparasitic Infections

Diseases Characterized by Vaginal Discharge

MANAGEMENT OF PATIENTS WHO HAVE VAGINAL INFECTIONS

Vaginitis is usually characterized by a vaginal discharge or vulvar itching and irritation; a vaginal odor may be present. The three diseases most frequently associated with vaginal discharge are trichomoniasis (caused by *Trichomonas vaginalis*), bacterial vaginosis (BV) (caused by a replacement of the normal vaginal flora by an overgrowth of anaerobic microorganisms and *Gardnerella vaginalis*), and candidiasis (usually caused by *Candida albicans*). Mucopurulent cervicitis (MPC) caused by *Chlamydia trachomatis* or *Neisseria gonorrhoeae* can sometimes cause vaginal discharge. Although vulvovaginal candidiasis usually is not transmitted sexually, it is included in this section because it is often diagnosed in women being evaluated for STDs.

Vaginitis is diagnosed by pH and microscopic examination of fresh samples of the discharge. The pH of the vaginal secretions can be determined by narrow-range pH paper for the elevated pH typical of BV or trichomoniasis (i.e., a pH of >4.5). One way to examine the discharge is to dilute a sample in one to two drops of 0.9% normal saline solution on one slide and 10% potassium hydroxide (KOH) solution on a second slide. An amine odor detected immediately after applying KOH suggests BV. A cover slip is placed on each slide, and they are examined under a microscope at low- and high-dry power. The motile *T. vaginalis* or the clue cells of BV usually are identified easily in the saline specimen. The yeast or pseudohyphae of *Candida* species are more easily identified in the KOH specimen. The presence of objective signs of vulvar inflammation in the absence of vaginal pathogens, along with a minimal amount of discharge, suggests the possibility of mechanical, chemical, allergic, or other noninfectious irritation of the vulva. Culture for *T. vaginalis* is more sensitive than microscopic examination. Laboratory testing fails to identify the cause of vaginitis among a substantial minority of women.

BACTERIAL VAGINOSIS (BV)

BV is a clinical syndrome resulting from replacement of the normal H_2O_2-producing *Lactobacillus sp.* in the vagina with high concentrations of anaerobic bacteria (e.g., *Prevotella sp.* and *Mobiluncus sp.*), *G. vaginalis*, and *Mycoplasma hominis*. BV is the most prevalent cause of vaginal discharge or malodor; however, half of the women whose illnesses meet the clinical criteria for BV are asymptomatic. The cause of the microbial alteration is not fully understood. Although BV is associated with having multiple sex partners, it is unclear whether BV results from acquisition of a sexually transmitted pathogen. Women who have never been sexually active are rarely affected. Treatment of the male sex partner has not been beneficial in preventing the recurrence of BV.

Diagnostic Considerations

BV can be diagnosed by the use of clinical or Gram stain criteria. Clinical criteria require three of the following symptoms or signs:

a. A homogeneous, white, noninflammatory discharge that smoothly coats the vaginal walls;
b. The presence of clue cells on microscopic examination;
c. A pH of vaginal fluid >4.5;
d. A fishy odor of vaginal discharge before or after addition of 10% KOH (i.e., the whiff test).

When a Gram stain is used, determining the relative concentration of the bacterial morphotypes characteristic of the altered flora of BV is an acceptable laboratory method for diagnosing BV. Culture of *G. vaginalis* is not recommended as a diagnostic tool because it is not specific.

Treatment

The principal goal of therapy for BV is to relieve vaginal symptoms and signs of infection. All women who have symptomatic disease require treatment, regardless of pregnancy status.

BV during pregnancy is associated with adverse pregnancy outcomes. The results of several investigations indicate that treatment of pregnant women who have BV and who are at high risk for preterm delivery (i.e., those who previously delivered a premature infant) might reduce the risk for prematurity. Therefore, high-risk pregnant women who do not have symptoms of BV may be evaluated for treatment.

Although some experts recommend treatment for high-risk pregnant women who have asymptomatic BV, others believe more information is needed before such a recommendation is made. A large, randomized clinical trial is underway to assess treatment for asymptomatic BV in pregnant women; the results of this investigation should clarify the benefits of therapy for BV in women at both low and high risk for preterm delivery.

The bacterial flora that characterizes BV has been recovered from the endometria and salpinges of women who have pelvic inflammatory disease (PID). BV has been associated with endometritis, PID, and vaginal cuff cellulitis after invasive procedures such as endometrial biopsy, hysterectomy, hysterosalpingography, placement of an intrauterine device, cesarean section, and uterine curettage. The results of one randomized controlled trial indicated that treatment of BV with metronidazole substantially reduced postabortion PID. On the basis of these data, consideration should be given to treatment of women who have symptomatic or asymptomatic BV before surgical abortion procedures are performed. However, more information is needed before recommending whether patients who have asymptomatic BV should be treated before other invasive procedures are performed.

Recommended Regimens for Nonpregnant Women

(For treatment of pregnant women, see Bacterial Vaginosis, Special Considerations, Pregnancy.)

Metronidazole 500 mg orally twice a day for 7 days,

OR

Clindamycin cream 2%, one full applicator (5 g) intravaginally at bedtime for 7 days,

OR

Metronidazole gel 0.75%, one full applicator (5 g) intravaginally twice a day for 5 days.

NOTE: Patients should be advised to avoid consuming alcohol during treatment with metronidazole and for 24 hours thereafter. Clindamycin cream is oil-based and might weaken latex condoms and diaphragms. Refer to condom product labeling for additional information.

Alternative Regimens

Metronidazole 2 g orally in a single dose,

OR

Clindamycin 300 mg orally twice a day for 7 days.

Metronidazole 2-g single-dose therapy is an alternative regimen because of its lower efficacy for BV. Oral metronidazole (500 mg twice a day) is efficacious for the treatment of BV, resulting in relief of symptoms and improvement in clinical course and flora disturbances. Based on efficacy data from four randomized controlled trials, overall cure rates 4 weeks after completion of treatment did not differ significantly between the 7-day regimen of oral metronidazole and the clindamycin vaginal cream (78% vs. 82%, respectively). Similarly, the results of another randomized controlled trial indicated that cure rates 7–10 days after completion of treatment did not differ significantly between the 7-day regimen of oral metronidazole and the metronidazole vaginal gel (84% vs. 75%, respectively). FDA has approved Flagyl ER™ (750 mg) once daily for 7 days for treatment of BV. However, data concerning clinical equivalency with other regimens have not been published.

Some health-care providers remain concerned about the possible teratogenicity of metronidazole, which has been suggested by experiments using extremely high and prolonged doses in animals. However, a recent meta-analysis does not indicate teratogenicity in humans. Some health-care providers prefer the intravaginal route because of a lack of systemic side effects (e.g., mild-to-moderate gastrointestinal disturbance and unpleasant taste). Mean peak serum concentrations of metronidazole after intravaginal administration are <2% the levels of standard 500-mg oral doses, and the mean bioavailability of clindamycin cream is approximately 4%.

Follow-Up

Follow-up visits are unnecessary if symptoms resolve. Recurrence of BV is not unusual. Because treatment of BV in high-risk pregnant women who are asymptomatic might prevent adverse pregnancy outcomes, a follow-up evaluation, at 1 month after completion of treatment, should be considered to evaluate whether therapy was successful. The alternative BV treatment regimens may be used to treat recurrent disease. No long-term maintenance regimen with any therapeutic agent is recommended.

Management of Sex Partners

The results of clinical trials indicate that a woman's response to therapy and the likelihood of relapse or recurrence are not affected by treatment of her sex partner(s). Therefore, routine treatment of sex partners is not recommended.

Special Considerations

Allergy or Intolerance to the Recommended Therapy

Clindamycin cream is preferred in case of allergy or intolerance to metronidazole. Metronidazole gel can be considered for patients who do not tolerate systemic metronidazole, but patients allergic to oral metronidazole should not be administered metronidazole vaginally.

Pregnancy

BV has been associated with adverse pregnancy outcomes (e.g., premature rupture of the membranes, preterm labor, and preterm birth), and the organisms found in increased concentration in BV also are frequently present in postpartum or postcesarean endometritis. Because treatment of BV in high-risk pregnant women (i.e., those who have previously delivered a premature infant) who are asymptomatic might reduce preterm delivery, such women may be screened, and those with BV can be treated. The screening and treatment should be conducted at the earliest part of the second trimester of pregnancy. The recommended regimen is metronidazole 250 mg orally three times a day for 7 days. The alternative regimens are a) metronidazole 2 g orally in a single dose or b) clindamycin 300 mg orally twice a day for 7 days.

Low-risk pregnant women (i.e., women who previously have not had a premature delivery) who have symptomatic BV should be treated to relieve symptoms. The recommended regimen is metronidazole 250 mg orally three times a day for 7 days. The alternative regimens are a) metronidazole 2 g orally in a single dose; b) clindamycin 300 mg orally twice a day for 7 days; or c) metronidazole gel, 0.75%, one full applicator (5 g) intravaginally, twice a day for 5 days. Some experts prefer the use of systemic therapy for low-risk pregnant women to treat possible subclinical upper genital tract infections.

Lower doses of medication are recommended for pregnant women to minimize exposure to the fetus. Data are limited concerning the use of metronidazole vaginal gel during pregnancy. The use of clindamycin vaginal cream during pregnancy is not recommended, because two randomized trials indicated an increase in the number of preterm deliveries among pregnant women who were treated with this medication.

HIV Infection

Patients who have BV and also are infected with HIV should receive the same treatment regimen as those who are HIV-negative.

TRICHOMONIASIS

Trichomoniasis is caused by the protozoan *T. vaginalis*. Most men who are infected with *T. vaginalis* do not have symptoms of infection, although a minority of men have NGU. Many women do have symptoms of infection. Of these women, *T. vaginalis* characteristically causes a diffuse, malodorous, yellow-green discharge with vulvar irritation; many women have fewer symptoms. Vaginal trichomoniasis might be associated with adverse pregnancy outcomes, particularly premature rupture of the membranes and preterm delivery.

Recommended Regimen
Metronidazole 2 g orally in a single dose.

Alternative Regimen*
Metronidazole 500 mg twice a day for 7 days.

*FDA has approved Flagyl 375™ mg twice a day for 7 days for treatment of trichomoniasis on the basis of pharmacokinetic equivalency of this regimen with metronidazole 250 mg three times a day for 7 days. No clinical data are available, however, to demonstrate clinical equivalency of the two regimens.

Metronidazole is the only oral medication available in the United States for the treatment of trichomoniasis. In randomized clinical trials, the recommended metronidazole regimens have resulted in cure rates of approximately 90%–95%; ensuring treatment of sex partners might increase the cure rate. Treatment of patients and sex partners results in relief of symptoms, microbiologic cure, and reduction of transmission. Metronidazole gel is approved for treatment of BV, but, like other topically applied antimicrobials that are unlikely to achieve therapeutic levels in the urethra or perivaginal glands, it is considerably less efficacious for treatment of trichomoniasis than oral preparations of metronidazole and is not recommended for use. Several other topically applied antimicrobials have been used for treatment of trichomoniasis, but it is unlikely that these preparations will have greater efficacy than metronidazole gel.

Follow-Up

Follow-up is unnecessary for men and women who become asymptomatic after treatment or who are initially asymptomatic. Infections with strains of *T. vaginalis* that have diminished susceptibility to metronidazole can occur; however, most of these organisms respond to higher doses of metronidazole. If treatment failure occurs with either regimen, the patient should be re-treated with metronidazole 500 mg twice a day for 7 days. If treatment failure occurs repeatedly, the patient should be treated with a single 2-g dose of metronidazole once a day for 3–5 days.

Patients with culture-documented infection who do not respond to the regimens described in this report and in whom reinfection has been excluded should be managed in consultation with an expert; consultation is available from CDC. Evaluation of such cases should include determination of the susceptibility of *T. vaginalis* to metronidazole.

Management of Sex Partners

Sex partners should be treated. Patients should be instructed to avoid sex until they and their sex partners are cured. In the absence of a microbiologic test of cure, this means when therapy has been completed and patient and partner(s) are asymptomatic.

Special Considerations

Allergy, Intolerance, or Adverse Reactions

Effective alternatives to therapy with metronidazole are not available. Patients who are allergic to metronidazole can be managed by desensitization (26).

Pregnancy

Patients can be treated with 2 g of metronidazole in a single dose.

HIV Infection

Patients who have trichomoniasis and also are infected with HIV should receive the same treatment regimen as those who are HIV-negative.

VULVOVAGINAL CANDIDIASIS

Vulvovaginal candidiasis (VVC) is caused by *C. albicans* or, occasionally, by other *Candida sp.*, *Torulopsis sp.*, or other yeasts. An estimated 75% of women will have at least one episode of VVC, and 40%–45% will have two or more episodes. A small percentage of women (i.e., probably <5%) experience recurrent VVC (RVVC). Typical symptoms of VVC include pruritus and vaginal discharge. Other symptoms may include vaginal soreness, vulvar burning, dyspareunia, and external dysuria. None of these symptoms is specific for VVC.

Diagnostic Considerations

A diagnosis of *Candida* vaginitis is suggested clinically by pruritus and erythema in the vulvovaginal area; a white discharge may occur. The diagnosis can be made in a woman who has signs and symptoms of vaginitis, and when either a) a wet preparation or Gram stain of vaginal discharge demonstrates yeasts or pseudohyphae or b) a culture or other test yields a positive result for a yeast species. *Candida* vaginitis is associated with a normal vaginal pH (≤4.5). Use of 10% KOH in wet preparations improves the visualization of yeast and mycelia by disrupting cellular material

that might obscure the yeast or pseudohyphae. Identifying *Candida* by culture in the absence of symptoms should not lead to treatment, because approximately 10%–20% of women usually harbor *Candida sp*. and other yeasts in the vagina. VVC can occur concomitantly with STDs or frequently following antibacterial vaginal or systemic therapy.

Treatment

Topical formulations effectively treat VVC. The topically applied azole drugs are more effective than nystatin. Treatment with azoles results in relief of symptoms and negative cultures among 80%–90% of patients who complete therapy.

Recommended Regimens

Intravaginal agents:

Butoconazole 2% cream 5 g intravaginally for 3 days,* †

OR

Clotrimazole 1% cream 5 g intravaginally for 7–14 days,* †

OR

Clotrimazole 100 mg vaginal tablet for 7 days,*

OR

Clotrimazole 100 mg vaginal tablet, two tablets for 3 days,*

OR

Clotrimazole 500 mg vaginal tablet, one tablet in a single application,*

OR

Miconazole 2% cream 5 g intravaginally for 7 days,* †

OR

Miconazole 200 mg vaginal suppository, one suppository for 3 days,* †

OR

Miconazole 100 mg vaginal suppository, one suppository for 7 days,* †

OR

Nystatin 100,000-unit vaginal tablet, one tablet for 14 days,

OR

Tioconazole 6.5% ointment 5 g intravaginally in a single application,* †

OR

Terconazole 0.4% cream 5 g intravaginally for 7 days,*

OR

Terconazole 0.8% cream 5 g intravaginally for 3 days,*

OR

Terconazole 80 mg vaginal suppository, one suppository for 3 days.*

Oral agent:

Fluconazole 150 mg oral tablet, one tablet in single dose.

Preparations for intravaginal administration of butoconazole, clotrimazole, miconazole, and tioconazole are available over-the-counter (OTC), and women with VVC can choose one of those preparations. The duration for treatment with these preparations may be 1, 3, or 7 days. Self-medication with OTC preparations should be advised only for women who have been diagnosed previously with VVC and who have a recurrence of the same symptoms. Any woman whose symptoms persist after using an OTC preparation or who has a recurrence of symptoms within 2 months should seek medical care.

A new classification of VVC may facilitate antifungal selection as well as duration of therapy. Uncomplicated VVC (i.e., mild-to-moderate, sporadic, nonrecurrent disease in a normal host with normally susceptible *C. albicans*) responds to all the aforementioned azoles, even those that are short-term (<7 days) and single-dose therapies. In contrast, complicated VVC (i.e., severe local or recurrent VVC in an abnormal host [e.g., VVC in a patient who has uncontrolled diabetes, or infection caused by a less susceptible fungal pathogen such as *Candida glabrata*]) requires a longer duration of therapy (i.e, 10–14 days) with either topical or oral azoles. Additional studies confirming this approach are in progress.

* These creams and suppositories are oil-based and might weaken latex condoms and diaphragms. Refer to condom product labeling for additional information.

† Over-the-counter (OTC) preparations.

Alternative Regimens
Several trials have demonstrated that oral azole agents (e.g., ketoconazole and itraconazole) might be as effective as topical agents. The ease of administering oral agents is an advantage over topical therapies. However, the potential for toxicity associated with using a systemic drug, particularly ketoconazole, must be considered.

Follow-Up

Patients should be instructed to return for follow-up visits only if symptoms persist or recur.

Management of Sex Partners

VVC usually is not acquired through sexual intercourse; treatment of sex partners is not recommended but may be considered for women who have recurrent infection. A minority of male sex partners may have balanitis, which is characterized by erythematous areas on the glans in conjunction with pruritus or irritation. These sex partners might benefit from treatment with topical antifungal agents to relieve symptoms.

Special Considerations

Allergy or Intolerance to the Recommended Therapy

Topical agents usually are free of systemic side effects, although local burning or irritation may occur. Oral agents occasionally cause nausea, abdominal pain, and headaches. Therapy with the oral azoles has been associated rarely with abnormal elevations of liver enzymes. Hepatotoxicity secondary to ketoconazole therapy occurs in an estimated one of every 10,000–15,000 exposed persons. Clinically important interactions might occur when these oral agents are administered with other drugs, including astemizole, calcium channel antagonists, cisapride, coumadin, cyclosporin A, oral hypoglycemic agents, phenytoin, protease inhibitors, tacrolimus, terfenadine, theophylline, trimetrexate, and rifampin.

Pregnancy

VVC often occurs during pregnancy. Only topical azole therapies should be used to treat pregnant women. Of those treatments that have been investigated for use during pregnancy, the most effective are butoconazole, clotrimazole, miconazole, and terconazole. Many experts recommend 7 days of therapy during pregnancy.

HIV Infection

Prospective controlled studies are in progress to confirm an alleged increase in incidence of VVC in HIV-infected women. No confirmed evidence has indicated a differential response to conventional antifungal therapy among HIV-positive women who have VVC. As such, women who have acute VVC and also are infected with HIV should receive the same treatment regimens as those who are HIV-negative.

Recurrent Vulvovaginal Candidiasis

RVVC, which usually is defined as **four** or more episodes of symptomatic VVC annually, affects a small percentage of women (i.e., probably <5%). The pathogenesis of RVVC is poorly understood. Risk factors for RVVC include uncontrolled diabetes mellitus, immunosuppression, and corticosteroid use. In some women who have RVVC, episodes occur after repeated courses of topical or systemic antibacterials. However, this association is not apparent in the majority of women. Most women who have RVVC have no apparent predisposing conditions. Clinical trials addressing the management of RVVC have involved continuing therapy between episodes.

Treatment

The optimal treatment for RVVC has not been established; however, an initial intensive regimen continued for approximately 10–14 days, followed immediately by a maintenance regimen for at least 6 months, is recommended. Maintenance ketoconazole 100 mg orally, once a day for ≤6 months, reduces the frequency of RVVC episodes. Investigations are evaluating a weekly fluconazole regimen, the results of which will be compared with once-monthly oral and topical antimycotic regimens that have only moderate protective efficacy. All cases of RVVC should be confirmed by culture before maintenance therapy is initiated.

Although patients with RVVC should be evaluated for predisposing conditions, routinely performing HIV testing for women with RVVC who do not have HIV risk factors is unnecessary.

Follow-Up
Patients who are receiving treatment for RVVC should receive regular follow-up evaluations to monitor the effectiveness of therapy and the occurrence of side effects.

Management of Sex Partners
Treatment of sex partners may be considered for partners who have symptomatic balanitis or penile dermatitis. However, routine treatment of sex partners usually is unnecessary.

Special Considerations
HIV Infection
Information is insufficient to determine the optimal management of RVVC among HIV-infected women. Until such information becomes available, management should be the same as for HIV-negative women who have RVVC.

Pelvic Inflammatory Disease (PID)

Pelvic inflammatory disease (PID) comprises a spectrum of inflammatory disorders of the upper female genital tract, including any combination of endometritis, salpingitis, tubo-ovarian abscess, and pelvic peritonitis. Sexually transmitted organisms, especially *N. gonorrhoeae* and *C. trachomatis*, are implicated in most cases; however, microorganisms that can be part of the vaginal flora (e.g., anaerobes, *G. vaginalis*, *H. influenzae*, enteric Gram-negative rods, and *Streptococcus agalactiae*) also can cause PID. In addition, *M. hominis* and *U. urealyticum* might be etiologic agents of PID.

DIAGNOSTIC CONSIDERATIONS

Acute PID is difficult to diagnose because of the wide variation in the symptoms and signs. Many women with PID have subtle or mild symptoms that do not readily indicate PID. Consequently, delay in diagnosis and effective treatment probably contributes to inflammatory sequelae in the upper reproductive tract. Laparoscopy can be used to obtain a more accurate diagnosis of salpingitis and a more complete bacteriologic diagnosis. However, this diagnostic tool often is not readily available for acute cases, and its use is not easy to justify when symptoms are mild or vague. Moreover, laparoscopy will not detect endometritis and may not detect subtle inflammation of the fallopian tubes. Consequently, a diagnosis of PID usually is based on clinical findings.

The clinical diagnosis of acute PID also is imprecise. Data indicate that a clinical diagnosis of symptomatic PID has a positive predictive value (PPV) for salpingitis of 65%–90% in comparison with laparoscopy. The PPV of a clinical diagnosis of acute PID differs depending on epidemiologic characteristics and the clinical setting, with higher PPV among sexually active young (especially teenaged) women and among patients attending STD clinics or from settings in which rates of gonorrhea or chlamydia are high. In all settings, however, no single historical, physical, or laboratory finding is both sensitive and specific for the diagnosis of acute PID (i.e., can be used both to detect all cases of PID and to exclude all women without PID). Combinations of diagnostic findings that improve either sensitivity (i.e., detect more women who have PID) or specificity (i.e., exclude more women who do not have PID) do so only at the expense of the other. For example, requiring two or more findings excludes more women who do not have PID but also reduces the number of women with PID who are identified.

Many episodes of PID go unrecognized. Although some cases are asymptomatic, others are undiagnosed because the patient or the health-care provider fails to recognize the implications of mild or nonspecific symptoms or signs (e.g., abnormal bleeding, dyspareunia, or vaginal discharge [atypical PID]). Because of the difficulty of diagnosis and the potential for damage to the reproductive health of women even by apparently mild or atypical PID, health-care providers should maintain a low threshold for the diagnosis of PID. Even so, the long-term outcome of early treatment of women with asymptomatic or atypical PID is unknown. The following recommendations for diagnosing PID are intended to help health-care providers recognize when PID should be suspected and when they need to obtain additional information to increase diagnostic certainty. These recommendations are based partially on the fact that

diagnosis and management of other common causes of lower abdominal pain (e.g., ectopic pregnancy, acute appendicitis, and functional pain) are unlikely to be impaired by initiating empiric antimicrobial therapy for PID.

Empiric treatment of PID should be initiated in sexually active young women and others at risk for STDs if all the following **minimum criteria** are present and no other cause(s) for the illness can be identified:

- Lower abdominal tenderness,
- Adnexal tenderness, and
- Cervical motion tenderness.

More elaborate diagnostic evaluation often is needed, because incorrect diagnosis and management might cause unnecessary morbidity. These additional criteria may be used to enhance the specificity of the minimum criteria listed previously. **Additional criteria** that support a diagnosis of PID include the following:

- Oral temperature >101°F (>38.3°C),
- Abnormal cervical or vaginal discharge,
- Elevated erythrocyte sedimentation rate,
- Elevated C-reactive protein, and
- Laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis*.

The **definitive criteria** for diagnosing PID, which are warranted in selected cases, include the following:

- Histopathologic evidence of endometritis on endometrial biopsy,
- Transvaginal sonography or other imaging techniques showing thickened fluid-filled tubes with or without free pelvic fluid or tubo-ovarian complex, and
- Laparoscopic abnormalities consistent with PID.

Although treatment can be initiated before bacteriologic diagnosis of *C. trachomatis* or *N. gonorrhoeae* infection, such a diagnosis emphasizes the need to treat sex partners.

TREATMENT

PID treatment regimens must provide empiric, broad-spectrum coverage of likely pathogens. Antimicrobial coverage should include *N. gonorrhoeae*, *C. trachomatis*, anaerobes, Gram-negative facultative bacteria, and streptococci. Although several antimicrobial regimens have been effective in achieving a clinical and microbiologic cure in randomized clinical trials with short-term follow-up, few investigations have a) assessed and compared these regimens with regard to elimination of infection in the endometrium and fallopian tubes or b) determined the incidence of long-term complications (e.g., tubal infertility and ectopic pregnancy).

All regimens should be effective against *N. gonorrhoeae* and *C. trachomatis*, because negative endocervical screening does not preclude upper-reproductive tract infection. Although the need to eradicate anaerobes from women who have PID has not been determined definitively, the evidence suggests that this may be important. Anaerobic bacteria have been isolated from the upper-reproductive tract of women who have PID, and data from in vitro studies have revealed that anaerobes such as *Bacteroides fragilis* can cause tubal and epithelial destruction. In addition, BV also is diagnosed in many women who have PID. Until treatment regimens that do not adequately cover these microbes have been shown to prevent sequelae as well as the regimens that are effective against these microbes, the recommended regimens should have anaerobic coverage. Treatment should be initiated as soon as the presumptive diagnosis has been made, because prevention of long-term sequelae has been linked directly with immediate administration of appropriate antibiotics. When selecting a treatment regimen, health-care providers should consider availability, cost, patient acceptance, and antimicrobial susceptibility.

In the past, many experts recommended that all patients who had PID be hospitalized so that bed rest and supervised treatment with parenteral antibiotics could be initiated. However, hospitalization is no longer synonymous with parenteral therapy. No currently available data compare the efficacy of parenteral with oral therapy or inpatient with outpatient treatment settings. Until the results from ongoing trials comparing parenteral inpatient therapy with oral outpatient therapy for women who have mild PID are available, such decisions must be based on observational data

and consensus opinion. The decision of whether hospitalization is necessary should be based on the discretion of the health-care provider.

The following criteria for **HOSPITALIZATION** are based on observational data and theoretical concerns:

- Surgical emergencies such as appendicitis cannot be excluded;
- The patient is pregnant;
- The patient does not respond clinically to oral antimicrobial therapy;
- The patient is unable to follow or tolerate an outpatient oral regimen;
- The patient has severe illness, nausea and vomiting, or high fever;
- The patient has a tubo-ovarian abscess; or
- The patient is immunodeficient (i.e., has HIV infection with low CD4 counts, is taking immunosuppressive therapy, or has another disease).

Most clinicians favor at least 24 hours of direct inpatient observation for patients who have tubo-ovarian abscesses, after which time home parenteral therapy should be adequate.

There are no efficacy data comparing parenteral with oral regimens. Experts have extensive experience with both of the following regimens. Also, there are multiple randomized trials demonstrating the efficacy of each regimen. Although most trials have used parenteral treatment for at least 48 hours after the patient demonstrates substantial clinical improvement, this is an arbitrary designation. Clinical experience should guide decisions regarding transition to oral therapy, which may be accomplished within 24 hours of clinical improvement.

Parenteral Regimen A

Cefotetan 2 g IV every 12 hours,

OR

Cefoxitin 2 g IV every 6 hours,

PLUS

Doxycycline 100 mg IV or orally every 12 hours.

NOTE: Because of pain associated with infusion, doxycycline should be administered orally when possible, even when the patient is hospitalized. Both oral and IV administration of doxycycline provide similar bioavailability. In the event that IV administration is necessary, use of lidocaine or other short-acting local anesthetic, heparin, or steroids with a steel needle or extension of the infusion time may reduce infusion complications. Parenteral therapy may be discontinued 24 hours after a patient improves clinically, and oral therapy with doxycycline (100 mg twice a day) should continue for a total of 14 days. When tubo-ovarian abscess is present, many health-care providers use clindamycin or metronidazole with doxycycline for continued therapy rather than doxycycline alone, because it provides more effective anaerobic coverage.

Clinical data are limited regarding the use of other second- or third-generation cephalosporins (e.g., ceftizoxime, cefotaxime, and ceftriaxone), which also might be effective therapy for PID and might replace cefotetan or cefoxitin. However, they are less active than cefotetan or cefoxitin against anaerobic bacteria.

Parenteral Regimen B

Clindamycin 900 mg IV every 8 hours,

PLUS

Gentamicin loading dose IV or IM (2 mg/kg of body weight), followed by a maintenance dose (1.5 mg/kg) every 8 hours. Single daily dosing may be substituted.

NOTE: Although use of a single daily dose of gentamicin has not been evaluated for the treatment of PID, it is efficacious in other analogous situations. Parenteral therapy may be discontinued 24 hours after a patient improves clinically, and continuing oral therapy should consist of doxycycline 100 mg orally twice a day or clindamycin 450 mg orally four times a day to complete a total of 14 days of therapy. When tubo-ovarian abscess is present, many health-care providers use clindamycin for continued therapy rather than doxycycline, because clindamycin provides more effective anaerobic coverage.

Alternative Parenteral Regimens

Limited data support the use of other parenteral regimens, but the following three regimens have been investigated in at least one clinical trial, and they have broad spectrum coverage.

Ofloxacin 400 mg IV every 12 hours,

PLUS

Metronidazole 500 mg IV every 8 hours.

OR

Ampicillin/Sulbactam 3 g IV every 6 hours,

PLUS

Doxycycline 100 mg IV or orally every 12 hours.

OR

Ciprofloxacin 200 mg IV every 12 hours,

PLUS

Doxycycline 100 mg IV or orally every 12 hours,

PLUS

Metronidazole 500 mg IV every 8 hours.

Ampicillin/sulbactam plus doxycycline has good coverage against *C. trachomatis*, *N. gonorrhoeae*, and anaerobes and appears to be effective for patients who have tubo-ovarian abscess. Both IV ofloxacin and ciprofloxacin have been investigated as single agents. Because ciprofloxacin has poor coverage against *C. trachomatis*, it is recommended that doxycycline be added routinely. Because of concerns regarding the anaerobic coverage of both quinolones, metronidazole should be included with each regimen.

ORAL TREATMENT

As with parenteral regimens, clinical trials of outpatient regimens have provided minimal information regarding intermediate and long-term outcomes. The following regimens provide coverage against the frequent etiologic agents of PID, but evidence from clinical trials supporting their use is limited. Patients who do not respond to oral therapy within 72 hours should be reevaluated to confirm the diagnosis and be administered parenteral therapy on either an outpatient or inpatient basis.

Regimen A

Ofloxacin 400 mg orally twice a day for 14 days,

PLUS

Metronidazole 500 mg orally twice a day for 14 days.

Oral ofloxacin has been investigated as a single agent in two well-designed clinical trials, and it is effective against both *N. gonorrhoeae* and *C. trachomatis*. Despite the results of these trials, ofloxacin's lack of anaerobic coverage is a concern; the addition of metronidazole provides this coverage.

Regimen B

Ceftriaxone 250 mg IM once,

OR

Cefoxitin 2 g IM plus **Probenecid** 1 g orally in a single dose concurrently once,

OR

Other parenteral third-generation **cephalosporin** (e.g., **ceftizoxime** or **cefotaxime**),

PLUS

Doxycycline 100 mg orally twice a day for 14 days. (Include this regimen with one of the above regimens.)

The optimal choice of a cephalosporin for Regimen B is unclear; although cefoxitin has better anaerobic coverage, ceftriaxone has better coverage against *N. gonorrhoeae*. Clinical trials have demonstrated that a single dose of cefoxitin is effective in obtaining short-term clinical response in women who have PID; however, the theoretical limitations in its coverage of anaerobes may require the addition of metronidazole. The metronidazole also will effectively treat BV, which also is frequently associated with PID. No data have been published regarding the use of oral cephalosporins for the treatment of PID.

Alternative Oral Regimens

Information regarding other outpatient regimens is limited, but one other regimen has undergone at least one clinical trial and has broad spectrum coverage. Amoxicillin/clavulanic acid plus doxycycline was effective in obtaining short-term clinical response in a single clinical trial; however, gastrointestinal symptoms might limit the overall success of this regimen. Several recent investigations have evaluated the use of azithromycin in the treatment of upper-reproductive tract infections; however, the data are insufficient to recommend this agent as a component of any of the treatment regimens for PID.

FOLLOW-UP

Patients receiving oral or parenteral therapy should demonstrate substantial clinical improvement (e.g., defervescence; reduction in direct or rebound abdominal tenderness; and reduction in uterine, adnexal, and cervical motion tenderness) within 3 days after initiation of therapy. Patients who do not demonstrate improvement within this time period usually require additional diagnostic tests, surgical intervention, or both.

If the health-care provider prescribes outpatient oral or parenteral therapy, a follow-up examination should be performed within 72 hours, using the criteria for clinical improvement described previously. Some experts also recommend rescreening for *C. trachomatis* and *N. gonorrhoeae* 4–6 weeks after therapy is completed. If PCR or LCR is used to document a test of cure, rescreening should be delayed for 1 month after completion of therapy.

MANAGEMENT OF SEX PARTNERS

Sex partners of patients who have PID should be examined and treated if they had sexual contact with the patient during the 60 days preceding onset of symptoms in the patient. The evaluation and treatment are imperative because of the risk for reinfection and the strong likelihood of urethral gonococcal or chlamydial infection in the sex partner. Male partners of women who have PID caused by *C. trachomatis* and/or *N. gonorrhoeae* often are asymptomatic.

Sex partners should be treated empirically with regimens effective against both of these infections, regardless of the apparent etiology of PID or pathogens isolated from the infected woman.

Even in clinical settings in which only women are treated, special arrangements should be made to provide care for male sex partners of women who have PID. When this is not feasible, health-care providers should ensure that sex partners are referred for appropriate treatment.

SPECIAL CONSIDERATIONS

Pregnancy

Because of the high risk for maternal morbidity, fetal wastage, and preterm delivery, pregnant women who have suspected PID should be hospitalized and treated with parenteral antibiotics.

HIV Infection

Differences in the clinical manifestations of PID between HIV-infected women and HIV-negative women have not been well delineated. In early observational studies, HIV-infected women with PID were more likely to require surgical intervention. In a subsequent and more comprehensive observational study, HIV-infected women who had PID had more severe symptoms than HIV-negative women but responded equally well to standard parenteral antibiotic regimens. In another study, the microbiologic findings for HIV-infected and HIV-negative women were similar, except for higher rates of concomitant *Candida* and HPV infections and HPV-related cytologic abnormalities among HIV-infected women. Immunosuppressed HIV-infected women who have PID should be managed aggressively using one of the parenteral antimicrobial regimens recommended in this report.

EPIDIDYMITIS

Among sexually active men aged <35 years, epididymitis is most often caused by *C. trachomatis* or *N. gonorrhoeae*. Epididymitis caused by sexually transmitted *E. coli* infection also occurs among homosexual men who are the insertive partners during anal intercourse. Sexually transmitted epididymitis usually is accompanied by urethritis, which often is asymptomatic. Nonsexually transmitted epididymitis associated with urinary tract infections caused by Gram-negative enteric organisms occurs more frequently among men aged >35 years, men who have recently undergone urinary tract instrumentation or surgery, and men who have anatomical abnormalities.

Although most patients can be treated on an outpatient basis, hospitalization should be considered when severe pain suggests other diagnoses (e.g., torsion, testicular infarction, and abscess) or when patients are febrile or might be noncompliant with an antimicrobial regimen.

DIAGNOSTIC CONSIDERATIONS

Men who have epididymitis typically have unilateral testicular pain and tenderness; hydrocele and palpable swelling of the epididymis usually are present. Testicular torsion, a surgical emergency, should be considered in all cases but is more frequent among adolescents. Torsion occurs more frequently in patients who do not have evidence of inflammation or infection. Emergency testing for torsion may be indicated when the onset of pain is sudden, pain is severe, or the test results available during the initial examination do not enable a diagnosis of urethritis or urinary tract infection to be made. If the diagnosis is questionable, an expert should be consulted immediately, because testicular viability may be compromised. The evaluation of men for epididymitis should include the following procedures:

- A Gram-stained smear of urethral exudate or intraurethral swab specimen for diagnosis of urethritis (i.e., ≥5 polymorphonuclear leukocytes per oil immersion field) and for presumptive diagnosis of gonococcal infection.
- A culture of urethral exudate or intraurethral swab specimen, or nucleic acid amplification test (either on intraurethral swab or first-void urine) for *N. gonorrhoeae* and *C. trachomatis*.
- Examination of first-void urine for leukocytes if the urethral Gram stain is negative. Culture and Gram-stained smear of uncentrifuged urine should be obtained.
- Syphilis serology and HIV counseling and testing.

TREATMENT

Empiric therapy is indicated before culture results are available. Treatment of epididymitis caused by *C. trachomatis* or *N. gonorrhoeae* will result in a) a microbiologic cure of infection, b) improvement of the signs and symptoms, c) prevention of transmission to others, and d) a decrease in the potential complications (e.g., infertility or chronic pain).

Recommended Regimens

For epididymitis most likely caused by gonococcal or chlamydial infection:

Ceftriaxone 250 mg IM in a single dose,

PLUS

Doxycycline 100 mg orally twice a day for 10 days.

For epididymitis most likely caused by enteric organisms,
or for patients allergic to cephalosporins and/or tetracyclines:

Ofloxacin 300 mg orally twice a day for 10 days.

As an adjunct to therapy, bed rest, scrotal elevation, and analgesics are recommended until fever and local inflammation have subsided.

FOLLOW-UP

Failure to improve within 3 days requires reevaluation of both the diagnosis and therapy. Swelling and tenderness that persist after completion of antimicrobial therapy should be evaluated comprehensively. The differential diagnosis includes tumor, abscess, infarction, testicular cancer, and tuberculous or fungal epididymitis.

MANAGEMENT OF SEX PARTNERS

Patients who have epididymitis that is known or suspected to be caused by *N. gonorrhoeae* or *C. trachomatis* should be instructed to refer sex partners for evaluation and treatment. Sex partners of these patients should be referred if their contact with the index patient was within the 60 days preceding onset of symptoms in the patient.

Patients should be instructed to avoid sexual intercourse until they and their sex partners are cured. In the absence of a microbiologic test of cure, this means until therapy is completed and patient and partner(s) no longer have symptoms.

SPECIAL CONSIDERATIONS

HIV Infection

Patients who have uncomplicated epididymitis and also are infected with HIV should receive the same treatment regimen as those who are HIV-negative. Fungi and mycobacteria, however, are more likely to cause epididymitis in immunosuppressed patients than in immunocompetent patients.

Cervical Cancer Screening for Women Who Attend STD Clinics or Have a History of STDs

Women who have a history of STD are at increased risk for cervical cancer, and women attending STD clinics may have other risk factors that place them at even greater risk. Prevalence studies have determined that precursor lesions for cervical cancer occur about five times more frequently among women attending STD clinics than among women attending family planning clinics.

The Pap smear (i.e., cervical smear) is an effective and relatively low-cost screening test for invasive cervical cancer and squamous intraepithelial lesions (SIL),* the precursors of cervical cancer. Both ACOG and the American Cancer Society (ACS) recommend annual Pap smears for all sexually active women. Although these guidelines take the position that Pap smears can be obtained less frequently in some situations, women with a history of STDs may need more frequent screening because of their increased risk for cervical cancer. Moreover, surveys of women attending STD clinics indicate that many women do not understand the purpose or importance of Pap smears, and almost half of the women who have had a pelvic examination erroneously believe they have had a Pap smear when they actually have not.

RECOMMENDATIONS

At the time of a pelvic examination for STD screening, the health-care provider should inquire about the result of the patient's last Pap smear and discuss the following information with the patient:

- The purpose and importance of a Pap smear;
- Whether a Pap smear was obtained during the clinic visit;
- The need for an annual Pap smear; and
- The names of local providers or referral clinics that can obtain Pap smears and adequately follow up results (i.e., if a Pap smear was not obtained during this examination).

If a woman has not had a Pap smear during the previous 12 months, a Pap smear should be obtained as part of the routine pelvic examination. Health-care providers should be aware that, after a pelvic examination, many women believe they have had a Pap smear when they actually have not, and thus may report having had a recent Pap smear. Therefore, in STD clinics, a Pap smear should be strongly considered during the routine clinical evaluation of women who have not had a normal Pap smear within the preceding 12 months that is documented within the clinic record or linked-system record.

*The 1988 *Bethesda System for Reporting Cervical/Vaginal Cytologic Diagnoses* introduced the terms "low-grade SIL" and "high-grade SIL" (27). Low-grade SIL encompasses cellular changes associated with HPV and mild dysplasia/cervical intraepithelial neoplasia 1 (CIN 1). High-grade SIL includes moderate dysplasia/CIN 2, severe dysplasia/CIN 3, and carcinoma in situ/CIN 3.

A woman may benefit from receiving printed information about Pap smears and a report containing a statement that a Pap smear was obtained during her clinic visit. If possible, a copy of the Pap smear result should be provided to the patient for her records.

FOLLOW-UP

Clinics and health-care providers who provide Pap smear screening services are encouraged to use cytopathology laboratories that report results using the Bethesda System of classification. If the results of the Pap smear are abnormal, care should be provided according to the *Interim Guidelines for Management of Abnormal Cervical Cytology* published by the National Cancer Institute Consensus Panel and briefly summarized below (27). Appropriate follow-up of Pap smears showing a high-grade SIL always includes referral to a clinician who has the capacity to provide a colposcopic examination of the lower genital tract and, if indicated, colposcopically directed biopsies. For a Pap smear showing low-grade SIL or atypical squamous cells of undetermined significance (ASCUS), follow-up without colposcopy *may* be acceptable in circumstances when the diagnosis is not qualified further or the cytopathologist favors a reactive process. In general, this would involve repeated Pap smears every 4–6 months for 2 years until the results of three consecutive smears have been negative. If repeated smears show persistent abnormalities, colposcopy and directed biopsy are indicated for low-grade SIL and should be considered for ASCUS. Women with a diagnosis of unqualified ASCUS associated with severe inflammation should at least be reevaluated with a repeat Pap smear after 2–3 months, then repeated Pap smears every 4–6 months for 2 years until the results of three consecutive smears have been negative. If specific infections are identified, the patient should be reevaluated after appropriate treatment for those infections. In all follow-up strategies using repeated Pap smears, the tests not only must be negative but also must be interpreted by the laboratory as "satisfactory for evaluation."

Because many public health clinics, including most STD clinics, cannot provide clinical follow-up of abnormal Pap smears with colposcopy and biopsy, women with Pap smears demonstrating high grade SIL or persistent low-grade SIL or ASCUS usually will need a referral to other local health-care providers or clinics for colposcopy and biopsy. Clinics and health-care providers who offer Pap smear screening services but cannot provide appropriate colposcopic follow-up of abnormal Pap smears should arrange referral services that a) can promptly evaluate and treat patients and b) will report the results of the evaluation to the referring clinician or health-care provider. Clinics and health-care providers should develop protocols that identify women who miss initial appointments (i.e., so that these women can be scheduled for repeat Pap smears), and they should reevaluate such protocols routinely. Pap smear results, type and location of follow-up appointments, and results of follow-up should be clearly documented in the clinic record. The development of colposcopy and biopsy services in local health departments, especially in circumstances where referrals are difficult and follow-up is unlikely, should be considered.

OTHER MANAGEMENT CONSIDERATIONS

Other considerations in performing Pap smears are as follows:

- The Pap smear is not an effective screening test for STDs.
- If a woman is menstruating, a Pap smear should be postponed, and the woman should be advised to have a Pap smear at the earliest opportunity.
- The presence of a mucopurulent discharge might compromise interpretation of the Pap smear. However, if the woman is unlikely to return for follow-up, a Pap smear can be obtained after careful removal of the discharge with a saline-soaked cotton swab.
- A woman who has external genital warts does not need to have Pap smears more frequently than a woman who does not have warts, unless otherwise indicated.
- In an STD clinic setting or when other cultures or specimens are collected for STD diagnoses, the Pap smear may be obtained last.
- Women who have had a hysterectomy do not require an annual Pap smear unless the hysterectomy was related to cervical cancer or its precursor lesions. In this situation, women should be advised to continue follow-up with the physician(s) who provided health care at the time of the hysterectomy.
- Both health-care providers who receive basic retraining on Pap smear collection and clinics that use simple quality assurance measures obtain fewer unsatisfactory smears.
- Although type-specific HPV testing to identify women at high and low risk for cervical cancer may become clinically relevant in the future, its utility in clinical practice is unclear, and such testing is not recommended.

SPECIAL CONSIDERATIONS

Pregnancy

Women who are pregnant should have a Pap smear as part of routine prenatal care. A cytobrush may be used for obtaining Pap smears in pregnant women, although care should be taken not to disrupt the mucous plug.

HIV Infection

Several studies have documented an increased prevalence of SIL in HIV-infected women, and HIV is believed by many experts to hasten the progression of precursor lesions to invasive cervical cancer. The following recommendations for Pap smear screening among HIV-infected women are consistent with other guidelines published by the U.S. Department of Health and Human Services (10,11,27,28) and are based partially on the opinions of experts in the care and management of cervical cancer and HIV infection in women.

- After obtaining a complete history of previous cervical disease, HIV-infected women should have a comprehensive gynecologic examination, including a pelvic examination and Pap smear as part of their initial evaluation. A Pap smear should be obtained twice in the first year after diagnosis of HIV infection and, if the results are normal, annually thereafter. If the results of the Pap smear are abnormal, care should be provided according to the *Interim Guidelines for Management of Abnormal Cervical Cytology* (28). Women who have a cytological diagnosis of high-grade SIL or squamous cell carcinoma should undergo colposcopy and directed biopsy. HIV infection is not an indication for colposcopy in women who have normal Pap smears.

Proctitis, Proctocolitis and Enteritis

Sexually transmitted gastrointestinal syndromes include proctitis, proctocolitis, and enteritis. Proctitis occurs predominantly among persons who participate in anal intercourse, and enteritis occurs among those whose sexual practices include oral-fecal contact. Proctocolitis can be acquired by either route, depending on the pathogen. Evaluation should include appropriate diagnostic procedures (e.g., anoscopy or sigmoidoscopy, stool examination, and culture).

Proctitis is an inflammation limited to the rectum (the distal 10–12 cm) that is associated with anorectal pain, tenesmus, and rectal discharge. *N. gonorrhoeae*, *C. trachomatis* (including LGV serovars), *T. pallidum*, and HSV usually are the sexually transmitted pathogens involved. In patients coinfected with HIV, herpes proctitis may be especially severe.

Proctocolitis is associated with symptoms of proctitis plus diarrhea and/or abdominal cramps and inflammation of the colonic mucosa extending to 12 cm. Fecal leukocytes may be detected on stool examination depending on the pathogen. Pathogenic organisms include *Campylobacter sp.*, *Shigella sp.*, *Entamoeba histolytica*, and, rarely, *C. trachomatis* (LGV serovars). CMV or other opportunistic agents may be involved in immunosuppressed HIV-infected patients.

Enteritis usually results in diarrhea and abdominal cramping without signs of proctitis or proctocolitis. In otherwise healthy patients, *Giardia lamblia* is most frequently implicated. Among HIV-infected patients, other infections that usually are not sexually transmitted may occur, including CMV, *Mycobacterium avium- intracellulare*, *Salmonella sp.*, *Cryptosporidium*, *Microsporidium*, and *Isospora*. Multiple stool examinations may be necessary to detect *Giardia*, and special stool preparations are required to diagnose cryptosporidiosis and microsporidiosis. Additionally, enteritis may be a primary effect of HIV infection.

When laboratory diagnostic capabilities are available, treatment should be based on the specific diagnosis. Diagnostic and treatment recommendations for all enteric infections are beyond the scope of these guidelines.

TREATMENT

Acute proctitis of recent onset among persons who have recently practiced receptive anal intercourse is most often sexually transmitted. Such patients should be examined by anoscopy and should be evaluated for infection with HSV,

N. gonorrhoeae, *C. trachomatis*, and *T. pallidum*. If anorectal pus is found on examination, or if polymorphonuclear leukocytes are found on a Gram-stained smear of anorectal secretions, the following therapy may be prescribed pending results of additional laboratory tests.

Recommended Regimen

Ceftriaxone 125 mg IM (or another agent effective against anal and genital gonorrhea),

PLUS

Doxycycline 100 mg orally twice a day for 7 days.

NOTE: For patients who have herpes proctitis, refer to Genital Herpes Simplex Virus (HSV) Infection.

FOLLOW-UP

Follow-up should be based on specific etiology and severity of clinical symptoms. Reinfection may be difficult to distinguish from treatment failure.

MANAGEMENT OF SEX PARTNERS

Sex partners of patients who have sexually transmitted enteric infections should be evaluated for any diseases diagnosed in the patient.

ECTOPARASITIC INFECTIONS

PEDICULOSIS PUBIS

Patients who have pediculosis pubis (i.e., pubic lice) usually seek medical attention because of pruritus. Such patients also usually notice lice or nits on their pubic hair.

Recommended Regimens

Permethrin 1% creme rinse applied to affected areas and washed off after 10 minutes.

OR

Lindane 1% shampoo applied for 4 minutes to the affected area, and then thoroughly washed off. This regimen is not recommended for pregnant or lactating women or for children aged <2 years.

OR

Pyrethrins with piperonyl butoxide applied to the affected area and washed off after 10 minutes.

The lindane regimen is the least expensive therapy; toxicity, as indicated by seizure and aplastic anemia, has not been reported when treatment was limited to the recommended 4-minute period. Permethrin has less potential for toxicity than lindane.

Other Management Considerations

The recommended regimens should not be applied to the eyes. Pediculosis of the eyelashes should be treated by applying occlusive ophthalmic ointment to the eyelid margins twice a day for 10 days.

Bedding and clothing should be decontaminated (i.e., either machine-washed or machine-dried using the heat cycle or dry-cleaned) or removed from body contact for at least 72 hours. Fumigation of living areas is not necessary.

Follow-Up

Patients should be evaluated after 1 week if symptoms persist. Re-treatment may be necessary if lice are found or if eggs are observed at the hair-skin junction. Patients who do not respond to one of the recommended regimens should be retreated with an alternative regimen.

Management of Sex Partners

Sex partners within the preceding month should be treated.

Special Considerations

Pregnancy

Pregnant and lactating women should be treated with either permethrin or pyrethrins with piperonyl butoxide.

HIV Infection

Patients who have pediculosis pubis and also are infected with HIV should receive the same treatment regimen as those who are HIV-negative.

SCABIES

The predominant symptom of scabies is pruritus. Sensitization to *Sarcoptes scabiei* must occur before pruritus begins. The first time a person is infected with *S. scabiei*, sensitization takes several weeks to develop. Pruritus might occur within 24 hours after a subsequent reinfestation. Scabies in adults may be sexually transmitted, although scabies in children usually is not.

Recommended Regimen

Permethrin cream (5%) applied to all areas of the body from the neck down and washed off after 8–14 hours.

Alternative Regimens

Lindane (1%) 1 oz. of lotion or 30 g of cream applied thinly to all areas of the body from the neck down and thoroughly washed off after 8 hours.

OR

Sulfur (6%) precipitated in ointment applied thinly to all areas nightly for 3 nights. Previous applications should be washed off before new applications are applied. Thoroughly wash off 24 hours after the last application.

Permethrin is effective and safe but costs more than lindane. Lindane is effective in most areas of the country, but lindane resistance has been reported in some areas of the world, including parts of the United States. Seizures have occurred when lindane was applied after a bath or used by patients who had extensive dermatitis. Aplastic anemia following lindane use also has been reported.

NOTE: Lindane should not be used after a bath, and it should not be used by a) persons who have extensive dermatitis, b) pregnant or lactating women, and c) children aged <2 years.

Ivermectin (single oral dose of 200 μg/kg or 0.8% topical solution) is a potential new therapeutic modality. However, no controlled clinical trials have been conducted to compare ivermectin with the currently recommended therapies.

Other Management Considerations

Bedding and clothing should be decontaminated (i.e., either machine-washed or machine-dried using the hot cycle or dry-cleaned) or removed from body contact for at least 72 hours. Fumigation of living areas is unnecessary.

Follow-Up

Pruritus may persist for several weeks. Some experts recommend re-treatment after 1 week for patients who are still symptomatic; other experts recommend re-treatment only if live mites are observed. Patients who do not respond to the recommended treatment should be retreated with an alternative regimen.

Management of Sex Partners and Household Contacts

Both sexual and close personal or household contacts within the preceding month should be examined and treated.

Management of Outbreaks in Communities, Nursing Homes, and Other Institutional Settings

Scabies epidemics often occur in nursing homes, acute- and chronic-care hospitals, residential facilities, and communities. Control of an epidemic can only be achieved by treatment of the entire population at risk. Epidemics should be managed in consultation with an expert.

Special Considerations

Infants, Young Children, and Pregnant or Lactating Women

Infants, young children, and pregnant or lactating women should not be treated with lindane. They may be treated with permethrin.

HIV Infection

Patients who have uncomplicated scabies and also are infected with HIV should receive the same treatment regimen as those who are HIV-negative. HIV-infected patients and others who are immunosuppressed are at increased risk for Norwegian scabies, a disseminated dermatologic infection. Such patients should be managed in consultation with an expert.

Medical providers play a vital role in the prevention and control of sexually transmitted diseases (STDs). Providers can help significantly reduce the occurrence of these diseases by:

- **Evaluating each patient, as appropriate, for evidence of STDs, and for evidence of high-risk sexual behaviors.**
- **Promptly diagnosing and treating patients with STDs according to current guidelines.**
- **Providing appropriate follow-up after patients have been treated.**
- **Providing education and counseling to patients engaging in high-risk sexual behaviors.**
- **Promptly reporting, as required by Missouri law, all cases of chlamydial infection, gonorrhea, syphilis, and hepatitis B to the local health department, or to the Missouri Department of Health (DOH) at (573) 751-6463.**

  Reports of cases of HIV infection/AIDS should be made as follows:
  - **Health care providers in St. Louis City and St. Louis County should report the individual to the St. Louis City Department of Health and Hospitals at (314) 658-1159.**
  - **Providers in the five-county Kansas City metropolitan area should report to the Kansas City Health Department at (816) 983-4200.**
  - **All other providers should report to DOH's Office of Surveillance at (573) 751-6463.**

Chlamydia pneumoniae and Coronary Heart Disease

Reprinted with permission from the Kansas City Health Department Community and Hospital Letter, August 1998, Vol. 19, No. 1. Gerald L. Hoff, Ph.D., F.A.C.E., Editor

Cardiovascular disease is the chief cause of death in the United States and western Europe, and atherosclerosis, the principal cause of myocardial and cerebral infarction, accounts for the majority of these deaths (N Engl J Med 314:488, 1986). Approximately 50 million Americans have cardiovascular disease, with a prevalence in middle age exceeding 61/100,000. In 1997, there were 2.3 million deaths attributed to myocardial infarction, 50% of all deaths in the United States (Curr Opinion Infect Dis 11:301, 1998).

A major topic of debate is whether or not the pathogenesis of atherosclerosis is the result of an infectious disease process involving *Chlamydia pneumoniae* (Infection 25:281, 1997). There is substantial evidence including sero-epidemiological studies, electron microscopy, immunocytochemistry, molecular detection assays, direct culture of the agent from pathological tissue, animal models and treatment trials that demonstrate both the presence of *C. pneumoniae* in diseased tissue and that some patients with atherosclerosis benefit from treatment with antibiotics (Can J Infect Dis 8:249, 1997; Circulation 96:404, 1997; Hippocrates 11:42, 1997). Still unanswered is whether the organism plays an etiologic role, serves as a cofactor, or is an innocent bystander in the development of coronary heart disease. Further complicating the picture is a recent serological study that links *C. pneumoniae* to hypertension (Hypertension 31:589, 1998).

Discovered in 1965, but firmly identified only a decade ago, *C. pneumoniae* is an airborne pathogen causing acute and persistent infections of both the upper and lower respiratory tracts (Pediatr Infect Dis J 16:549, 1997). Infection is usually mild or asymptomatic, but can be severe, especially in the elderly. Most primary infections occur during school age and antibodies are usually not found in children <5 years of age. Among adults the seroprevalence is 40–70%. Reinfections are common, and serum

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antibodies do not appear to be protective (Emerg Infect Dis 2:307, 1996).

The association of *C. pneumoniae* with heart disease began in 1988 when Finnish investigators demonstrated an association between the presence of IgG and IgA antibodies to *C. pneumoniae* in patients with a diagnosis of angina pectoris (Lancet ii:983, 1988). Subsequent seroepidemiological studies have supported the existence of a real association between *C. pneumoniae* and coronary heart disease. There are, however, limitations to these data, but higher antibody titers have a more consistent association with coronary heart disease than lower antibody titers.

The most convincing evidence that *C. pneumoniae* is involved in atheromas is by demonstrating its presence directly in the tissue and then by recovery of viable organisms from the pathological tissue (Ann Intern Med 125:979, 1996; J Infect Dis 176:292, 1997). Although the presence of *C. pneumoniae* can be demonstrated in atheromatous tissue, recovery of the organism is rare. This may be because the organism can persist in an uncultivable state. Under certain conditions, chlamydia species can revert to a non-replicating state resulting in persistence (Microbiol Rev 58:686, 1994).

The pathogenic role of *C. pneumoniae* in atherogenesis still remains unclear. One theory is that *C. pneumoniae* infects alveolar macrophages which subsequently enter the circulation and deposit within the arterial wall, possibly at the site of previous endothelial damage (Brit Med J 314:1778, 1997). The organisms would then cause a local vascular infection. Once at this site, the infection may spread to endothelial and smooth cells. The cytokine pathway which is subsequently triggered would provide a milieu for smooth muscle proliferation, resulting in intimal growth and occlusion of the arterial wall. Activation of macrophages may result in further stimulation of cytokines resulting in increased levels of IFN-γ and IL-12. IFN-γ has been shown to inhibit the replicative cycle of *C. pneumoniae*, resulting in the persistence of the organism in a non-replicative state. In addition, activation of the macrophages would result in the accumulation of oxidized low density lipoproteins. This process ultimately would result in foamy macrophages, the hallmark of the atherosclerotic plaque. Interestingly, the T lymphocytes identified within the intima of fatty streaks uniformly respond to heat shock proteins, one of which is expressed by *C. pneumoniae* during its intracellular life cycle (Lancet 341:255, 1993).

The consequence of *C. pneumoniae* uptake by macrophages and the mechanism of damage at the site of coronary arteries remain unknown, but there are several possibilities (Curr Opinion Infect Dis 11:301, 1998). First, the organism simply may reside in the macrophages within the atheroma without causing any deleterious effects. Such an association would be purely coincidental. Second, chronic macrophage infection may contribute to local inflammation and the development of atheromatous plaque. Third, *C. pneumoniae* infection may induce the chronic immune activation mediated by the cytokines that contribute to direct chronic endothelial cell damage or stimulate the synthesis of acute phase proteins, such as fibrinogen and C-reactive protein, which are noted to be increased in coronary heart disease patients. Finally, chronic infection may lead to an enhanced proagulant state with increased risk of coronary thrombosis, which could be mediated by monocyte-derived proagulants, such as tissue factor, circulating immune complexes, or by monocyte derived cytokines.

To examine fully whether *C. pneumoniae* plays an important role in coronary heart disease, antibiotic trials aimed at targeting this organism in patients at risk for myocardial infarction are extremely important. The main studies have used azithromycin or roxithromycin and have reduced the risk of myocardial infarction, although there are several different possibilities for the results. First, both antibiotics through their anti-chlamydial activity, may suppress the reactivation of chronic infection within an atherosclerotic plaque. By eradicating or suppressing the infection, these antibiotics may have helped to stabilize the active plaque lesions in part by dampening inflammation and hypercoagulation. Alternatively, these antibiotics may have acted against other infections, which may be linked to coronary heart disease and cardiovascular risk factors. For example, chronic infection with *Helicobacter pylori* has been hypothesized to play a role in causing ischemic heart disease (Circulation 97:1675, 1998). Finally, the results could be viewed as secondary to an effect unrelated to antimicrobial action. Both antibiotics are known to have anti-inflammatory activity, which could have attenuated persistent inflammation in the plaque leading to a more stable state unrelated to the effect on a microbe.

If specific anti-chlamydial eradication therapy is confirmed as being able to reduce cardiovascular events, it will be likely that patients who have suffered a myocardial infarction and have evidence of *C. pneumoniae* infection will be treated with a regimen consisting of aspirin, beta-blocker, angiotensin-converting enzyme inhibitor, antioxidants, and an antibiotic. Concerns over the misuse of antibiotics and the development of antimicrobial resistance then will become further controversial issues.

Recently, Bennett Lorber asked the question “are all diseases infectious?” and pointed out that a number of diseases not believed to be due to an infectious etiology many years ago, most notably peptic ulcer disease, have now been shown to be due to a microbial agent (Ann Intern Med 125:844, 1997). It remains an open question whether atherosclerosis is attributable to *C. pneumoniae*.

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optimal HIV prevention effort can be instituted. These issues include limited staff time, lack of training for staff, and the perception that the patient population to which care is provided is at low risk for HIV infection. The response to these issues must include:

- Helping providers develop methods to provide effective HIV risk assessment, education and counseling to their patients in a time- and resource-efficient manner.
- Providing convenient opportunities for education and training of physicians, nurses and other medical staff.
- Helping providers understand that any practice setting can include patients at risk for HIV infection, and that this risk may not be recognized by either the provider or the patient.

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Perinatal HIV and AIDS Cases in Missouri

- √ 34 perinatal* HIV cases** and 41 perinatal AIDS cases have been reported to the Missouri Department of Health through December 31, 1997.
- √ During 1997, 2 perinatal HIV cases and 2 perinatal AIDS cases were reported.
- √ 52.9% of perinatal HIV cases and 61.0% of perinatal AIDS cases were in African Americans; the remainder were in whites.
- √ Of reported perinatal HIV cases, 11.8% were from St. Louis City, 17.6% were from St. Louis County, 20.6% were from Kansas City, and 50.0% were from Outstate Missouri.
- √ Of reported perinatal AIDS cases, 29.3% were from St. Louis City, 22.0% were from St. Louis County, 17.1% were from Kansas City, and 31.7% were from Outstate Missouri.
- √ 55.9% of perinatal HIV cases and 65.9% of perinatal AIDS cases were related to injecting drug use (i.e., the mother was either an injecting drug user or had sex with an injecting drug user.)

* Perinatal cases are the result of HIV transmission from an infected mother to her infant before or at the time of birth.

** HIV cases are persons infected with HIV whose disease has not progressed to the point that they meet the AIDS case definition.

Pregnancy-Related Mortality in Missouri: 1990–1997

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Introduction

The *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* for the United States listed maternal mortality as a priority area for improvement, including specific goals of no more than 3.3 maternal deaths per 100,000 live births overall, and no more than 5.0 maternal deaths per 100,000 live births among black women.[1] The 1990–1997 Missouri maternal mortality rate was 14.3 deaths per 100,000 live births. The pregnancy-related mortality ratio for black women is over three times higher than for white women in Missouri. This study was conducted to understand the factors associated with the high maternal mortality ratios in Missouri.

Methods

A death was considered to be a potential pregnancy-related death if

- the pregnancy check box, indicating that the woman had been pregnant within 90 days of death, was marked on the death certificate;
- the death certificate otherwise indicated that the woman was pregnant at the time of death;
- the death certificate was matched with a birth certificate or fetal death record for a delivery that occurred within one year before the woman's death; or
- the cause of death was described on the certificate by a key word indicative of pregnancy.

A death was classified as pregnancy-related if it resulted from

- complications of pregnancy,
- a chain of events initiated by pregnancy, or
- aggravation of an unrelated condition by the physiologic or pharmacological effects of pregnancy.[2]

We excluded deaths associated with neoplasms (exclusive of molar pregnancy) and deaths due to trauma because of the difficulty of determining the relationship of pregnancy in these cases.

Several of the variables on the death certificates were examined including the immediate and underlying causes of death, any associated obstetrical conditions or complications, and the outcome of the pregnancy. Information was obtained from death certificates (including notes written in the margins), autopsy reports, medical records, matched birth and fetal death certificates and contact with the physician of record, medical examiner or coroner in certain ambiguous cases.

Live birth and fetal death certificates were available for most women who delivered a live-born or stillborn infant. These certificates provided information on items such as live birth order and prenatal care status that was not available on the maternal death certificates. Equivalent sources of data were not available for women who had an induced or spontaneous abortion, ectopic pregnancy, or who died without delivery of a live-born or stillborn infant.

Inadequate prenatal care was defined as fewer than five prenatal visits for pregnancies less than 37 weeks, fewer than eight visits for those 37 weeks or longer, or care beginning after the first four months of pregnancy. We determined Medicaid status from information on the birth or fetal death certificates, the only source we had available for this information for all of the years from 1990–1997.

Pregnancy-related mortality ratios (PRMRs) were calculated as deaths per 100,000 live births.

Results

A total of 246 potential pregnancy-related deaths were found for the years 1990–1997 using the framework described above. We excluded 156 deaths including 24 due to various

Table 1. Number Live Births, Number of Pregnancy-Related Deaths and Pregnancy-Related Mortality Ratio (PRMR)* by Year of Death, Missouri, 1990–1997

Year of Death	Number of Live Births	Number of Deaths	PRMR
1990	79,135	9	11.4
1991	78,468	9	11.5
1992	76,005	11	14.5
1993	75,146	7	9.3
1994	73,279	13	17.7
1995	72,804	13	17.9
1996	73,733	15	20.3
1997	73,940	9	12.2
Total	**602,510**	**86**	**14.3**

*Pregnancy-related deaths per 100,000 live births

Table 2. Number of Pregnancy-Related Deaths, Pregnancy-Related Mortality Ratio (PRMR)* and Risk Ratio by Race, Missouri, 1990–1997

Race	Number of Deaths	PRMR	Risk Ratio	95% CI†
White	50	10.1	Referent	
Black	34	34.6	3.4	(2.28–4.58)
Other	2	20.0	2.0	(0.00–4.73)
Total	**86**	**14.3**		

*Pregnancy-related deaths per 100,000 live births
†Confidence interval

Table 3. Number of Pregnancy-Related Deaths, Pregnancy-Related Mortality Ratio (PRMR)* and Risk Ratio by Age, Missouri, 1990–1997

Age Group	Number of Deaths	PRMR	Risk Ratio	95% CI†
<20	10	11.6	1.0	(0.37–1.56)
20–29	40	11.9	Referent	
30–34	20	16.0	1.3	(0.75–1.93)
≥35	16	29.9	2.5	(1.28–3.74)
Total	**86**	**14.3**		

*Pregnancy-related deaths per 100,000 live births
†Confidence interval

neoplasms because the cause of death did not appear to be related to pregnancy. We excluded four additional deaths with an uncertain relation to pregnancy. The remaining 86 deaths were used as the basis of this analysis. Birth certificates were available for 44 (96%) of 46 maternal deaths associated with live births. Matched fetal death certificates were available for 8 (80%) of 10 maternal deaths associated with stillbirth (fetal deaths >20 weeks gestation). There were 30 pregnancy-related maternal deaths that were not associated with either a live or still birth.

The overall pregnancy-related mortality ratio for the eight-year surveillance period was 14.3 deaths per 100,000 live births. While there appears to be an upward trend in the number of cases year by year as shown in Table 1, the annual number of pregnancy-related deaths in Missouri did not vary significantly over time ($p = 0.22$ using the Poisson regression), ranging from seven to 15 deaths per year.

Black women were 3.4 times more likely to die from pregnancy-related causes than were white women. See Table 2. Age was also associated with pregnancy-related mortality, particularly for women aged 35 years and older, who had a 2.5 times higher risk for death than women aged 20–29 years. See Table 3.

The most common pregnancy outcome associated with a pregnancy-related death was a live birth (54%), followed by an undelivered pregnancy (15%), a stillbirth (12%), a spontaneous abortion (6%), an ectopic pregnancy (5%) and an induced abortion (5%).

The overall risk for pregnancy-related death among unmarried women was twice as great as that for married women. The PRMR was 21.5 deaths per 100,000 live births for all unmarried women and 10.9 for all married women. The age-adjusted PRMR for unmarried white women was 2.1 times greater than that for married white women, whereas this same ratio for unmarried black women was one half of that for married black women.

Of all the women who died following a live birth in which adequacy of prenatal care was known, four (10%) had received no prenatal care and 10 (25%) had inadequate prenatal care. The risk of pregnancy-related death was 8.6 times higher for women who received no prenatal care than for women who received adequate care and 2.0 times greater for those who received inadequate prenatal care.

The risk for pregnancy-related death increased with increasing live-birth order, beginning with women delivering their first live-born infant, for all women whose pregnancies resulted in a live birth. The PRMR was 1.6 times higher for women following delivery of a third or higher-order live-born infant than for women following a first live birth (10.2 vs. 6.5).

Hemorrhage was the underlying cause of death for 17 (20%) women, regardless of pregnancy outcome. Fifteen (17%) women died from a pulmonary embolism, and infection was the cause of death for 14 (16%) women. Pregnancy-induced hypertension complications were the underlying cause of death for 12 (14%) women. Eleven (13%) women died from cardiovascular complications and three (4%) from anesthesia complications. Fourteen (16%) died from other causes.

There were 40 pregnancy-related deaths in the St. Louis region (including only St. Louis City and St. Louis County) compared to 46 in the rest of the state. The PRMR for the region was 24.0 compared to 10.6 for the rest of the state. See Table 4 on page 30. Thus, women residing in the St. Louis region had a 2.3 times greater risk for pregnancy-related death than women from the rest of the state. The risk for pregnancy-related death in the St. Louis region among resident black women was 4.7 times greater than that for resident white women. In comparison

(continued on page 30)

(continued from page 29)
with black women from the rest of the state, black women of the St. Louis region had 3.4 times the risk for pregnancy-related death, whereas the risk for pregnancy-related death among white women of the St. Louis region was approximately the same as that for white women from the rest of the state.

PRMRs were elevated for black women in the St. Louis region throughout the study period.

Medicaid status was known for 52 (60%) of pregnancy-related deaths. The PRMR for women on Medicaid was 10.8 compared with 8.0 for women not on Medicaid. This 35 percent differential primarily reflected white differentials which were 8.4 for Medicaid compared to 5.9 for non-Medicaid. Black women not on Medicaid had a PRMR approximately double those of black women on Medicaid: 30.4 versus 15.0 respectively. Among the 38 women delivering a live-born infant in which adequacy of prenatal care was known, nine (43%) Medicaid participants received no or inadequate prenatal care compared with one (6%) for non-Medicaid participants.

The risk for pregnancy-related death was analyzed with respect to hospital obstetric level for all women who delivered a live-born or stillborn infant. The PRMRs were significantly higher for hospitals which provided level 3, the highest level of obstetric services. The PRMR for level 1 was 6.1, for level 2 it was 5.3 and it was 10.3 for level 3 hospitals.

Discussion

Readers familiar with Missouri official vital statistics may note that the number of pregnancy-related deaths described here exceeds by 48 percent the 58 maternal deaths included in the published reports for 1990–1997. In this analysis, a number of additional deaths were found which could be included under the currently prevailing criteria specifying "a chain of events that was initiated by the pregnancy" or "the aggravation of an unrelated condition by the physiologic or pharmacological effects of the pregnancy." These additional deaths were included as maternal deaths based on the more recent medical literature which has established these criteria. Exclusion of deaths due to trauma gives a sharper focus on the more obvious causes of pregnancy-related mortality but may obscure other relationships such as the reported increase in self-inflicted trauma among postpartum women.[3]

Berg et al.[4] in 1996 wrote that "increased efforts to identify pregnancy-related deaths have contributed to an increase in pregnancy-related mortality" but that "more than half of such deaths...are probably still unreported." Sachs et al.[3], reporting on maternal deaths in Massachusetts from 1976–1985, found that 43 percent were determined to be preventable by a maternal death review committee. It is uncertain how the current definitions of pregnancy-related deaths would have affected this percentage.

Since relatively high St. Louis black PRMRs occurred throughout the surveillance period of 1990–1997, it is unlikely that recent changes in the health care system, such as the implementation of Medicaid Managed Care in late 1995 or the closing of the St. Louis Regional Medical Center in late 1996, were the primary cause of the high St. Louis ratios.

It is not unexpected that the larger hospitals with level 3 obstetric status had higher PRMRs since they provide care for the most difficult and complicated patients.

Public Health Measures

Increased efforts should be made to assure that pregnant women receive prenatal care early in the course of pregnancy. Providers caring for pregnant black women should be mindful of the increased risk of death even for those women who are married. Providers caring for pregnant women aged at least 35 years or those women following delivery of a third or higher-order live-born infant should also be aware of the increased risk of death.

Prenatal and perinatal care should focus on prevention of hemorrhage, pulmonary embolism, infection, pregnancy-induced hypertension, and cardiovascular and anesthesia complications. These conditions are not necessarily preventable in the sense of avoiding the condition altogether. Early detection and skilled management of these complications is essential, i.e. the condition

Table 4. Number of Pregnancy-Related Deaths and Pregnancy-Related Mortality Ratio (PRMR)* by Select Resident Counties and Race, Missouri, 1990–1997

	White			Black			All Races		
Resident County	**No.**	**PRMR**	**95% CI†**	**No.**	**PRMR**	**95% CI**	**No.**	**PRMR**	**95% CI**
St. Louis City	0	0.0	0.0	20	54.3	(30.48–78.03)	20	35.6	(20.02–51.25)
St. Louis	10	12.1	(4.59–19.54)	9	35.7	(12.38–59.03)	20	18.0	(10.14–25.95)
Total	**10**	**9.9**	**(3.76–16.03)**	**29**	**46.7**	**(29.72–63.73)**	**40**	**24.0**	**(16.54–31.38)**
Rest of State**	40	10.2	(7.04–13.37)	5	13.8	(1.71–25.98)	46	10.6	(7.51–13.61)

*Pregnancy-related deaths per 100,000 live births
†Confidence interval
**Excludes St. Louis City and St. Louis County

may not be prevented, but death due to the condition would ideally be avoided through appropriate secondary and tertiary prevention. Secondary prevention may include referral to a high risk obstetrician or perinatal subspecialist while tertiary prevention may include not only referral to specialists, but also emergency treatment and transport to tertiary obstetrical centers. Consultation with management of these complications and referral of high-risk women should be strongly considered.

The excess of pregnancy-related deaths in Missouri over the goals set by the Healthy People 2000 objectives may be due to potentially preventable conditions such as pregnancy-induced hypertension and infections. Some complications during or shortly after pregnancy may be unanticipated, even in otherwise healthy women receiving exemplary care. Some complications, however, may be due to substance abuse or worsening of existing precarious medical conditions as a consequence of unintended pregnancy. Some complications may arise, or be poorly managed, by virtue of lack of competent obstetrical services due to problems with access to care or due to personal choice. There may be nothing which can be done for some unanticipated rare events. However, substance abuse, unintended pregnancy and availability and quality of services are important public health concerns.

We propose convening an expert group to review each maternal death in a timely manner to assist in the discovery of preventable causes of maternal mortality.[3] Such a group should include obstetricians and perinatologists with expertise in management of high risk pregnancy along with public health experts in maternal health and in epidemiology. It should include representatives from all the academic obstetric centers in the state. Review of each maternal death by such a group could help to classify the deaths as to their relation to pregnancy and to determine the types of deaths that could have been prevented. Review of outpatient and inpatient records could determine whether lapses in quality of care may have been responsible for some deaths. Such information would be valuable in setting priorities and giving guidance to programs for continuing obstetrical education and to other programs to improve care and prevent maternal deaths. It would be desirable to have such a group empowered with legislative authority.

As more is learned about medical prevention of premature birth, the quality of prenatal care will achieve paramount importance as opposed to the present focus on surrogate measures of timing and quantity of prenatal visits. Understanding the problems in the health care system that may contribute to pregnancy-related mortality may aid our understanding of the problems with quality of prenatal care.

Conclusion

During 1990–1997, 86 Missouri deaths were determined to be pregnancy-related. The overall PRMR was 14.3 deaths per 100,000 live births, yet there were no statistically significant trends in the annual rates during these years. The PRMR for black women was consistently higher than that for white women for almost every factor examined by race. Older women, particularly women aged 35 years and older, were at increased risk for pregnancy-related deaths. The overall risk for pregnancy-related death among unmarried women was twice as great as that for married women. The risk for pregnancy-related death was 8.6 times higher for women who received no care than for women who received adequate prenatal care. Overall, resident women of the St. Louis region had 2.3 times the risk of pregnancy-related death compared to women from the rest of the state.

Major changes must be made in the care provided to pregnant women if changes are to occur in maternal mortality and in order to reach the desirable goals for the year 2000. Review of individual maternal deaths by an expert group is proposed as a means to this end.

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3. Sachs BP, Brown DAJ, Driscoll SG et al. Maternal Mortality in Massachusetts. NEJM 1987;316: 667-72.
4. Berg CJ, Atrash HK, Koonin LM, Tucker M. Pregnancy-Related Mortality in the United States, 1987-1990. Obstetrics and Gynecology 1996;88: 161-67.

Disease Reporting

Cases of reportable diseases and conditions should be reported promptly to your local health department, or to the Missouri Department of Health at

(800) 392-0272
(during working hours)
or
(573) 751-4674
(after hours, weekends or holidays)

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The Managing Editor is H. Denny Donnell, Jr, MD, MPH, State Epidemiologist. Production Manager is Diane C. Rackers. Questions or comments should be directed to (573) 751-6128 or toll free (800) 392-0272.

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LATE BREAKERS

☞ The Department of Health has finalized its integrated strategic plan for 1998. The plan contains goals, objectives and strategies focused on the following four areas of interest to public health in Missouri:

- Protecting the Health of Missouri's Children
- Preventing or Controlling Communicable Diseases
- Reducing the Burden of Chronic Diseases
- Safeguarding the Public

You can obtain a copy of the strategic plan by contacting Barb Wilbers, Governmental Policy and Legislation at (573) 751-6003. The strategic plan will also be made available through the Department of Health Home Page at http://www.health.state.mo.us.

☞ F. T. Satalowich, D.V.M., M.S.P.H., Chief, Bureau of Veterinary Public Health, retired from the Department of Health on October 31, 1998. Dr. Satalowich served as State Public Health Veterinarian for the past 17 years. His consultation and efforts to prevent the spread of zoonotic diseases will be missed.

☞ In October, Kurt M. Kleier was promoted to Assistant Chief of the Office of Surveillance in the Division of Environmental Health and Communicable Disease Prevention. Since December 1996, Kleier has managed the statewide STD/HIV Surveillance Program. He will retain these duties in addition to assisting with administrative functions.

☞ The Missouri Department of Health is proposing to amend the following rules:

19 CSR 20-20.020 Reporting Communicable, Environmental and Occupational Diseases
19 CSR 20-20.080 Duties of Laboratories
19 CSR 20-26.030 HIV Antibody Test Consultation and Reporting
19 CSR 20-26.040 Physician HIV Antibody Test Consultation and Reporting
19 CSR 20-26.070 Notification of Results of Court-Ordered HIV Testing of Sexual Offenders

Individuals who wish to obtain details and/or provide comments regarding the proposed amendments should contact Dr. Howard Pue in the Office of Surveillance at Ph: (573) 526-5324, Fax: (573) 522-8032 or E-mail: pueh@mail.health.state.mo.us.